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**CLOSURE PLAN FOR
LAND DISPOSAL UNIT CPP-48
EXCESS CHEMICAL FRENCH DRAIN**

JUNE 10, 1991

**IDAHO NATIONAL ENGINEERING LABORATORY
DEPARTMENT OF ENERGY
IDAHO OPERATIONS OFFICE**

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LIST OF ACRONYMS

ANSI/ASME	American National Standards Institute/American Society of Mechanical Engineers
BGL	Below Ground Level
CEP	Controls for Environmental Pollution, Inc.
cmp	counts per minute
COCA	Consent Order and Compliance Agreement
CSWP	Construction Safe Work Permit
DOE-HQ	U.S. Department of Energy Headquarters in Washington, D.C.
DOE-ID	U.S. Department of Energy, Idaho Operations Office
DOT	U.S. Department of Transportation
DPE	Drilling Project Engineer
EPA	Environmental Protection Agency
FFA/CO	Federal Facilities Agreement/Consent Order
FPR	Fuel Processing Restoration
GAI	Golder Associates Inc.
GSELI	Gulf South Environmental Laboratory, Inc.
HEA	Health Environment Assessment
HP	Health Physics Personnel
I.D.	Inside Diameter
ICPP	Idaho Chemical Processing Plant
INEL	Idaho National Engineering Laboratory
LDU	Land Disposal Unit
LPG	Lead Project Geologist
NQA-1	Quality Assurance Program Requirement for Nuclear Facilities
O.D.	Outside Diameter
OVA	Organic Vapor Analyzer
PNELI	Pacific Northwest Environmental Laboratory, Inc.
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Program Plan
QASP	Quality Assurance Sampling Plan
RCRA	Resource Conservation and Recovery Act
RfD	Chronic Reference Dose
RPD	Relative Percent Difference
SRPA	Snake River Plain Aquifer
SWMU	Solid Waste Management Unit
TCLP	Toxic Characteristic Leach Procedure
TIC	Tentatively Identified Compounds
USDA	United States Department of Agriculture
UTL	Upper Tolerance Limits
UURI	University of Utah Research Institute
VMF	Vehicle Monitoring Facility
WCF	Waste Calcining Facility
WINCO	Westinghouse Idaho Nuclear Company
RWMC	Radioactive Waste Management Complex

EXECUTIVE SUMMARY

This closure plan is being submitted to comply with the Idaho National Engineering Laboratory (INEL) Consent Order and Compliance Agreement (COCA), which requires the submittal of a closure plan for each Land Disposal Unit (LDU). LDU CPP-48 is located in the center of Idaho Chemical Processing plant (ICPP) just south of the Waste Calcining Facility (WCF, or CPP-633). The unit consists of an excess chemical french drain approximately 5 feet in diameter and 8-10 feet deep with steel side walls, a steel lid, and no bottom.

The french drain was used between approximately 1975 and late October 1981 for the disposal of processing waste, consisting of nitric acid, aluminum nitrate and calcium nitrate from the WCF. Approximately one to two gallons of waste were released to the french drain at any one time. Wastes released to the french drain were not treated or neutralized before percolating into the soil column. Prior to use of the french drain, the chemicals were released to a trench at the current location of the french drain. Use of the french drain has been discontinued. There are no records of the quantities of chemicals disposed of in the french drain.

CPP-48 was listed as an LDU because of the potential of nitric acid (HNO_3), aluminum nitrate and calcium nitrate contamination to the soils resulting from the percolation of these untreated wastes to the subsurface. The primary objectives for the characterization of LDU CPP-48 were to 1) determine the nature and extent of possible contamination due to the release of chemicals from the french drain into the soil column and 2) determine if the HNO_3 or any other targeted hazardous constituent poses an unacceptable risk to human health, safety, and the environment.

Analyses of soil samples from one borehole (to a depth of 46.5 feet) were conducted to determine if any hazardous constituents were present. Analytical results show arsenic (13.2 mg/Kg) and nitrate (4.68 and 5.71 mg/Kg) were detected above background UTL. The elevated levels of arsenic, 2 X background, is a function of the soil chemistry and is not related to the waste stream disposed in the LDU CPP-48. Nitrates in the soil are not considered hazardous.

Validated sample analysis data indicate Cs-137 ($3.3 \pm .1$ pCi/gm) in one sample and Sr-90 in three samples ($.18 \pm .09$ pCi/gm, $.12 \pm .09$ pCi/gm, and $.26 \pm .10$ pCi/gm). These values are slightly above detection levels. Due to the depth detected, and the fact that no radiological contamination being detected above background (which ranged from 125 to 175 counts per minute) during routine site characterization surveys, the Cs-137 and Sr-90 do not pose a threat to human health, safety, and the environment.

Soil sampling and analysis was previously conducted in 1986. Analysis results indicated no EP-Toxicity metals exceeding regulatory limits. The results of the current sampling analysis verify no hazardous constituents are present at LDU CPP-48.

RCRA hazardous waste was disposed of at LDU CPP-48. This waste was hazardous based on characteristic (corrosivity). However, the soil is no longer hazardous based on the characteristics in RCRA. Therefore, this site should be clean closed under RCRA.

1.0 FACILITY CONDITIONS

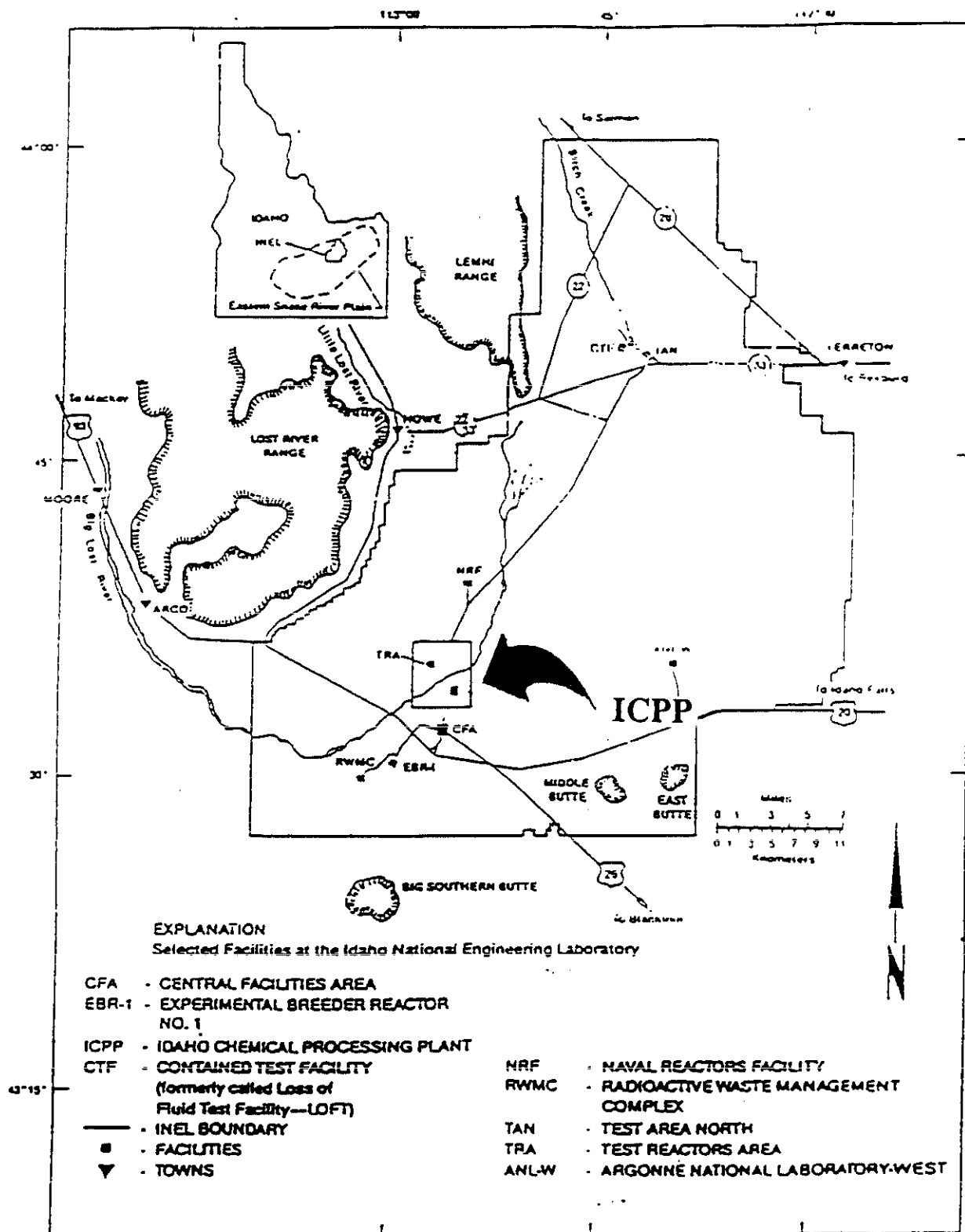
1.1 General Description

Land Disposal Unit (LDU) CPP-48 is located in the center of the Idaho Chemical Processing Plant (ICPP) (see Figure 1-1 and 1-2), just south of the Waste Calcining Facility (WCF), or CPP-633. The primary mission of the ICPP, which began operations in 1953, has been for reprocessing of nuclear fuel, recovery of uranium and krypton, and management of the generated waste. The WCF used a fluidized-bed calcination process to convert radioactive waste solutions to solids. A detailed drawing of the site is shown in Figure 1-3. The unit consists of a french drain approximately 5 feet in diameter and 8 to 10 feet deep with steel side walls, a steel lid, and no bottom.

The french drain was used between approximately 1975 and late October 1981 for the disposal of processing waste, consisting primarily of nitric acid, aluminum nitrate, and calcium nitrate from the WCF (WINCO, 1989a; Sehlke, 1990). Approximately 1 to 2 gallons of waste were released to the french drain at any one time. Wastes were released to the french drain by an above ground rubber line which was removed in 1981. The wastes were not treated or neutralized before percolating into the soil column through the bottom of the french drain. Prior to use of the french drain, the chemicals were released to a trench at the current location of the french drain (WINCO, 1986). The soil excavated from the trench was used to back fill around the french drain structure. Use of the french drain has been discontinued. There are no records of the quantities of chemicals disposed of in the french drain.

1.2 Unit Characterization Objectives

CPP-48 was listed as an LDU because of the potential of nitric acid, aluminum nitrate, and calcium nitrate contamination to the soils resulting from the percolation of these untreated wastes to the subsurface. Because of the high buffering capacity of the soil at ICPP no ground water contamination is expected. The primary objectives for the characterization of LDU CPP-48 were to 1) determine the nature and extent of possible contamination due to the



Note: LDU CPP-48 is located at the ICPP

FIGURE 1-1
GENERAL INEL SITE MAP

EG&G/ICPP-33/10

(after Bartholomay, et al, 1989)

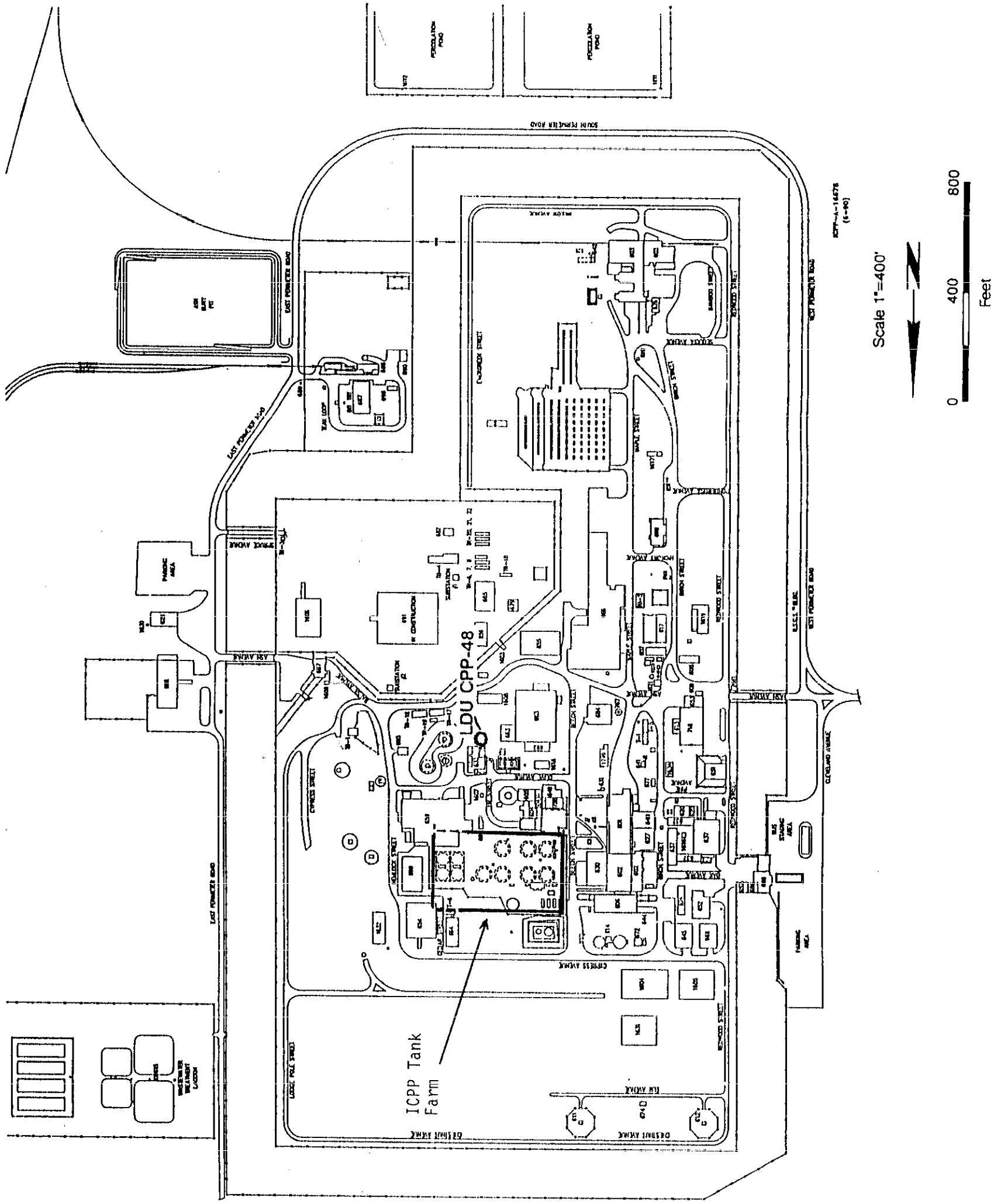


FIGURE 1-2
ICPP SITE PLAN
EG&G/ICPP-46 CLOSURE REPORT/D

18" VENT DUCT IN CONCRETE ENCASEMENT

VAULT
AREA

CPP-633

Approximate location of
above ground pipeline.

CONCRETE ENVELOPE
3-1" ELECTRICAL CONDUIT

3"PS
(ABANDONED IN PLACE)



DRY WELL



CPP-48 EXCESS
CHEMICAL
DUMP TANK

Scale 1" = 10'



21131-100045

FIGURE 1-3
LOCATION OF LDU CPP-48
EG&G/CPP-48 CLOSURE REPORT/D

Golder Associates

release of chemicals from the french drain into the soil column and 2) determine if the nitric acid or any other targeted hazardous constituent poses an unacceptable risk to human health, safety, and the environment.

1.3 Closure Determinations

Unit closure will be based on the presence of hazardous waste or concentration of hazardous constituents and the level of risk posed to human health and safety and the environment. If a Health and Environmental Assessment is conducted it will be done in accordance with the requirements of the proposed corrective action regulations for Solid Waste Management Facilities (Fed. Reg. Vol. 55, No. 145 30798-30844). If hazardous wastes are not detected or hazardous constituents are present in quantities that do not pose an unacceptable risk to human health and safety or the environment, a plan will be submitted to the U.S. Environmental Protection Agency (EPA) and the State of Idaho requesting clean closure without removal.

If contamination is detected that poses an unacceptable risk to human health, safety, or the environment, all contaminated soil that exceeds the regulatory or risk-based levels will be excavated and disposed of according to the applicable regulations. The unit will be clean closed in accordance with the requirements of 40 CFR 265, Subpart G (Closure and Post-Closure).

The action level requiring Resource Conservation and Recovery Act (RCRA) closure of LDU CPP-48 will be based on the pH of the soils and/or the presence of metals or organics above Toxicity Characteristic Leach Procedure (TCLP) limits. The action level associated with pH is less than or equal to 2 or greater than or equal to 12.5. Additional action levels for the other hazardous constituents will be based on an unacceptable risk to human health, safety and the environment.

1.4 Closure Goals

Closure goals for CPP-48 are dependent upon sampling results. If sampling indicates constituents do not pose an unacceptable risk to human health, safety, and the environment, the closure goal for CPP-48 will be to clean close without removal. If results of sampling indicate levels above regulatory limits, a significant health and safety impact, or an unacceptable environmental hazard, excavation and removal or decontamination may be required. If required, the goal will be to clean close the site by decontaminating and/or removing all facility equipment and contaminated soils.

2.0 GEOLOGY

2.1 General Geology

The ICPP is located on alluvial materials deposited by the Big Lost River. Surficial sediments at the ICPP can be divided into two distinct layers. The surface layer to a depth of 35 to 40 feet is a gravel to gravelly sand that averages about 60 percent gravel and 40 percent sand. This coarse surface layer is underlain in many places with a layer (0 to 10 feet) of finer grained materials composed of clayey sands and sand-clay mixtures that directly overlie the basalt. The fine grained layer has an average sand content of 33 percent and an average silt-plus-clay content of 64 percent. The interface between surficial sediments and underlying basalt generally occurs at a depth of 40 to 50 feet below the original land surface (WINCO, 1989a and WINCO, 1989b). Basalt has been encountered at depths of 33.5, 39.7, 46.0, and 44.1 feet during other investigations conducted at the ICPP (GAI, 1991c).

Underlying the surficial sediments are 2000 to 3000 feet of basalt flows with interbedded sedimentary materials. One of the most important of these sedimentary interbeds is a clayey layer that locally occurs at a depth of about 110 feet below land surface and, although variable in thickness, may be 15 to 30 feet thick. For example, in the vicinity of the tank farm, results from the drilling and sampling program have shown the thickness of the

interbed to vary between 0.5 and 11.2 feet. The interbed commonly consists of moderate reddish to yellowish brown, damp, non-stratified, stiff to hard, silty clay to clayey silt (GAI, 1991c).

The sequence of interbedded basalt and sediments continues to well below the water table. There is some evidence of a sedimentary bed at a depth of 750 feet below land surface, which may be the effective bottom of the aquifer below the ICPP (WINCO, 1989a and WINCO, 1989b).

Fractures in the basalts commonly have silt and clay filling material where the basalt has been exposed on the surface. There are also volcaniclastic layers within the basalts that are composed primarily of sand- and gravel-sized material. Sedimentary interbeds are likely to be composed of sand-silt- and clay-sized materials (WINCO, 1989a and WINCO, 1989b).

2.2 Site-Specific Geology/Geochemistry

The alluvial material have been disturbed and regraded to a variable depth stimulated at 12 feet below the ground surface to install the french drain. Based on the color, aggregate composition and size range of the particles, anthropogenetic fill at LDU CPP-33 is probably derived from nearby sources and is therefore similar in composition to undisturbed alluvium, found elsewhere in the vicinity of the site. Figure 2-1 shows the generalized stratigraphic column associated with the ICPP.

Based upon the visual observations of core samples taken at LDU CPP-48, the following is a description of the lithology beneath the site. The lithologic log for this borehole is included in Appendix A. Soil samples from the shallow (0 to 12 feet) alluvial material consist of compact unstratified, poorly sorted, damp, (i.e., enough moisture is present to darken the appearance, but no moisture on materials adheres to the hand) sandy gravel (12 to 30 percent sand). Below the disturbed fill material, dense to very dense alluvial gravels (of similar composition to those described above) are interbedded with dense to very dense, poorly sorted, damp sand layers. This pattern was seen to extend down to a depth of 43.2 feet below surface, where a

very stiff to hard, moist (i.e., sufficient moisture is present to moisten the hand) clayey silt to silt was encountered and persisted down to the basalt. Minor silty units were also noted at depths of 38.0 and 41.8 feet below ground level (BGL). The basalt was reached at 46.5 feet BGL.

The soils in the area have a high calcium carbonate content, which provide the soil with a high buffering capacity (Bartholomey, 1990). Thus, an acid such as nitric acid is neutralized as the hydrogen ion concentration forms carbonic acid and the nitrate binds with the calcium to form calcium nitrate. Carbonic acid is eventually released in the form of $\text{CO}_2(\text{g})$.

Generalized Stratigraphic Column for the Idaho Chemical Processing Plant

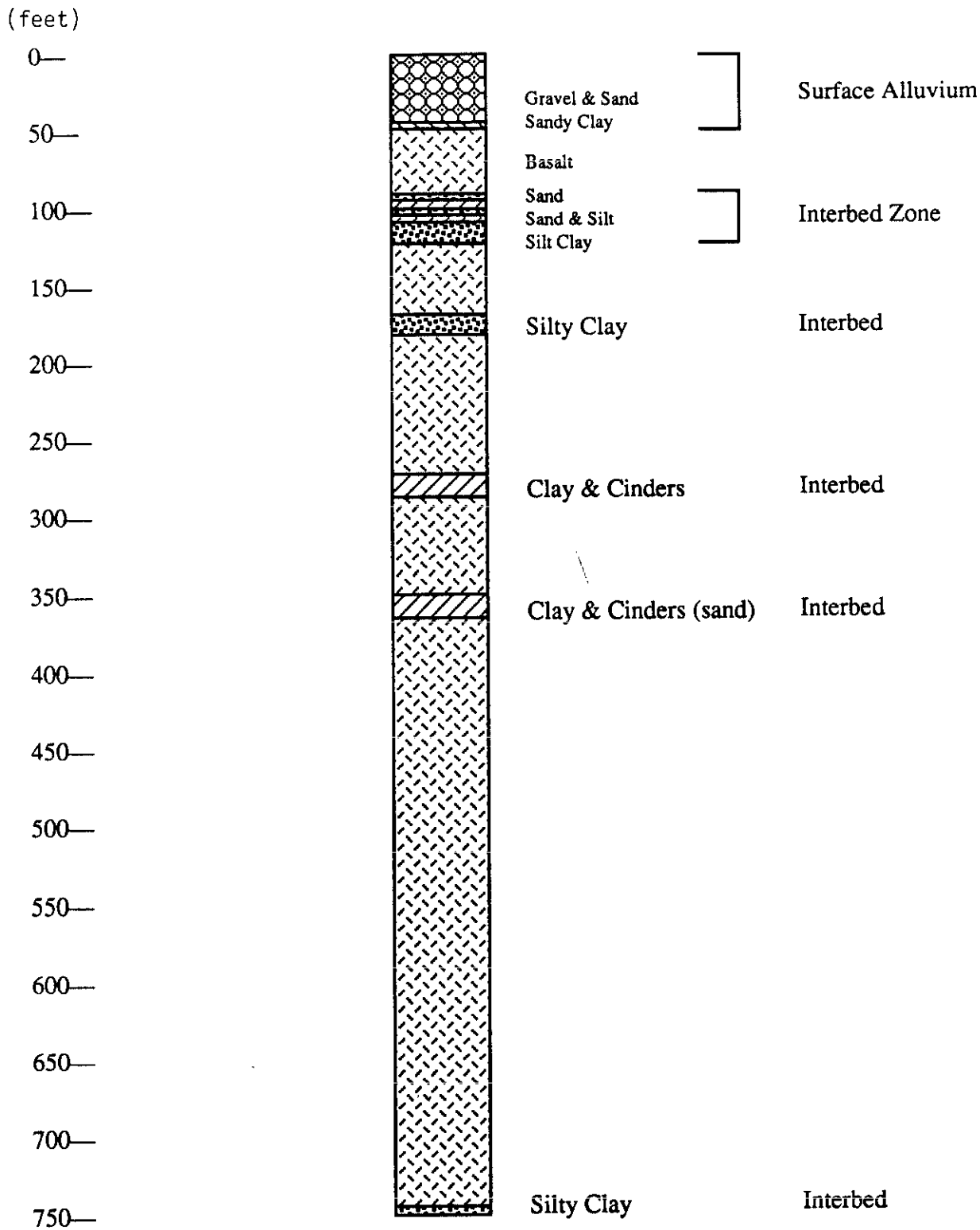


Figure 2-1

3.0 HYDROLOGY

3.1 Surface Water

The Big Lost River is the major surface water feature on the INEL with its headwaters located west of the site. The Big Lost River flows to the southeast past the town of Arco, Idaho, onto the Snake River Plain, then turns to the northeast, flowing onto the INEL and terminating in three playa lakes. As the river flows onto the plain, the channel branches into many distributaries, and the flow is spread broadly, losing water by infiltration into the channel bottom (Pittman, 1988). The Big Lost River is ephemeral and flows onto the site only during periods of high runoff. The last time flow reached the area of the ICPP was in 1987. The INEL Diversion Dam, constructed in 1984, is located approximately 9 miles upstream from the ICPP (Figure 3-1). It was designed to control flooding on the INEL site by diverting water into designated spreading areas.

3.2 Groundwater

The depth to the water table of the Snake River Plain Aquifer (SRPA) at the ICPP is approximately 450 feet below land surface, based on 1990 water level measurements (Golder Associates Inc., 1990d). The direction and rate of groundwater movement in the vicinity of the ICPP are well documented from monitoring contaminant plumes in the Snake River Plain Aquifer. The direction of flow in the vicinity of the ICPP is generally from north-northeast to south-southwest. The rate of flow ranges from 5 to 15 ft/day (WINCO, 1989a and WINCO, 1989b).

Perched groundwater zones are known to exist below the ICPP. One perched zone, described by Hull, 1988, is located at an approximate depth of 40 feet at the contact between the surficial alluvial sediments and the uppermost Snake River Plain basalt flow. The groundwater is locally perched by a silty/clayey layer overlying the basalt. Recent drilling in the Tank Farm area has not encountered groundwater perched at this interface.

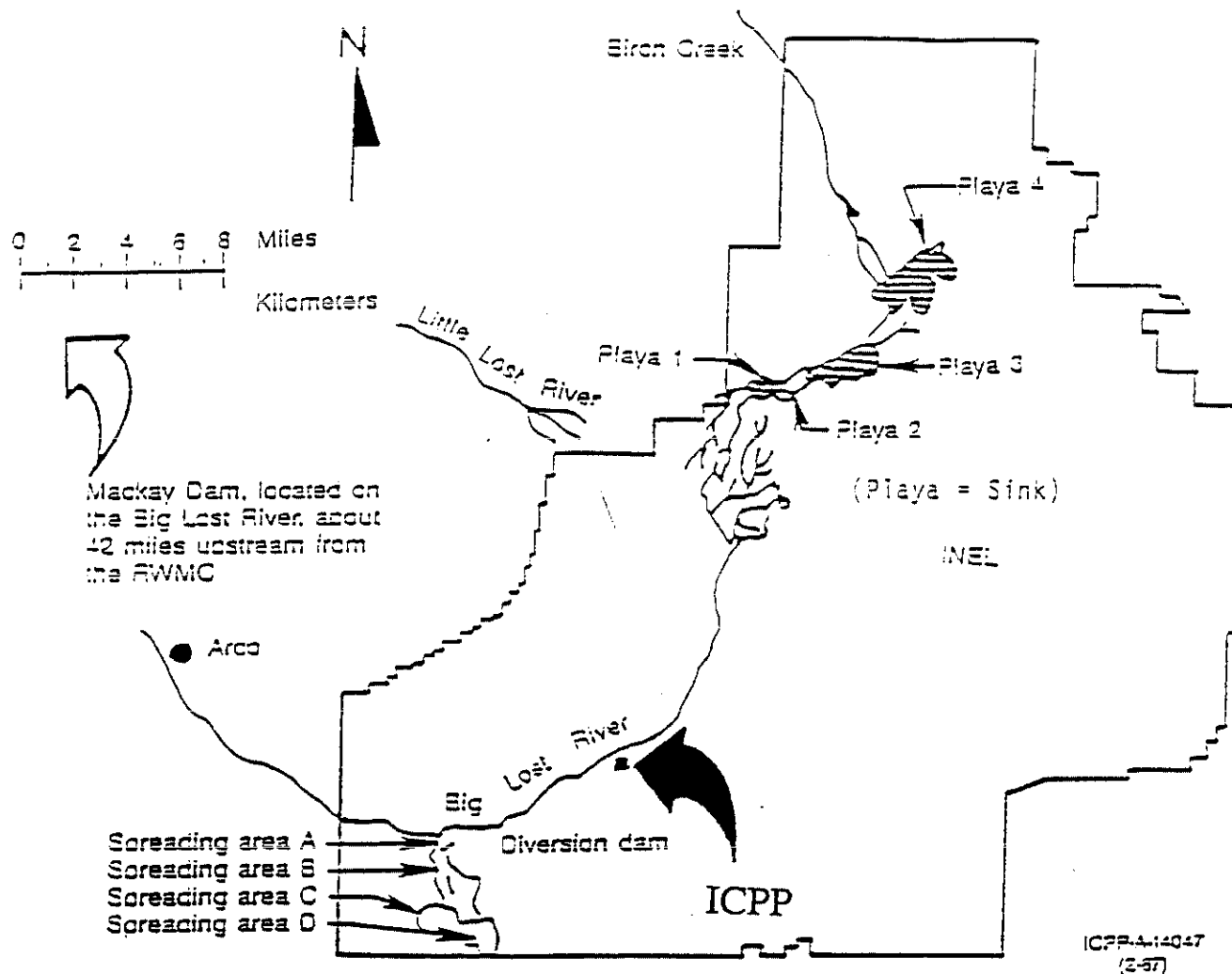


Figure 3-1 Surface water features at or near the INEL
(Robertson, et al., 1974)

A second zone is located along the top of a low-permeability sedimentary interbed located at approximately 110 feet BGL. This perched zone does not appear to be laterally continuous under the ICPP. Although previous drilling at the ICPP has encountered this perched zone, several boreholes in the vicinity of the tank farm gave no indication that this perched water was intercepted.

Preliminary results from drilling activities in the Tank Farm area have also identified several perched zones that have developed within vesicular zones overlying the relatively impermeable massive basalt. These perched groundwater zones occur irregularly within the Snake River Plain basalts. In general, the interconnection, direction of flow, and extent of these perched zones is not currently known. The final report describing this interpretation is currently being prepared.

4.0 METEOROLOGY

4.1 Temperature

Average monthly maximum temperatures at the INEL range from 87°F in July to 28°F in January. Average monthly minimum temperatures range from 49°F in July to 4°F in January. The warmest temperature recorded was 101°F, and the coldest temperature through January 1982 has been -40°F (Clausen, Ricks, Start, 1989).

4.2 Wind

The average wind speed at the INEL is about 5 miles/hr in December and maximum of 9 miles/hr in April and May. The highest maximum hourly average speed was 51 miles/hr, measured at the 20-foot level at the Central Facilities Area (CFA) from the west-southwest. Peak gusts of 78 and 87 miles/hr have been observed. Calm conditions prevail 11 percent of the time (Clausen, Ricks, Start, 1989).

4.3 Precipitation

The average annual precipitation at the INEL is 9.07 inches of water. The yearly totals range from 4.50 to 14.40 inches. Individual months have had as little as no precipitation to as much as 4.42 inches. Maximum observed 24-hour precipitation amounts are less than 2.0 inches, and maximum 1-hour amounts are just over 1.0 inch (Clausen, Ricks, Start, 1989).

About 26.0 inches of snow fall each year. The maximum yearly total was 40.9 inches, and the smallest total was 11.3 inches. The greatest 24-hour total snowfall was 8.6 inches. The greatest snow depth observed on the ground was 27 inches (Clausen, Ricks, Start, 1989). January and February average about 7.0 inches for a monthly maximum snow depth on the ground. The ground is usually free of snow from mid-April to mid-November.

4.4 Evaporation

While extensive evaporation data has not been collected on the INEL, evaporation information is available from the towns of Aberdeen and Kimberly, both located on the Snake River Plain in southeastern Idaho, and which have climatic conditions similar to the INEL. The data from these areas is believed to be representative of the INEL region and indicates that the average annual evaporation rate is about 42 inches. Recent data from Rexburg, Idaho, located approximately 75 miles east northeast of the ICPP indicates a similar evaporation rate. About 80 percent of the evaporation, 29 in/yr, occurs from May through October (Clausen, Ricks, Start, 1989).

4.5 Summary

The above information is provided as a general overview of the climatic conditions at the ICPP. Relatively small volumes of moisture are available for transport of nitrates or any other constituent to the underlying soils and/or aquifers (Thomas, 1988, estimates an average annual recharge rate equal to 0.5 inches/year).

5.0 KNOWN OR SUSPECTED WASTE TYPES

5.1 Chemical-Hazardous Waste

Based on process knowledge and interviews with operations personnel, the wastes disposed of to LDU CPP-48 were composed of nitric acid, aluminum nitrate, and calcium nitrate solutions (WINCO, 1989a).

5.2 Radioactivity

No radiological wastes were disposed of at LDU CPP-48.

6.0 PRE-CLOSURE SAMPLING AND ANALYTICAL RESULTS

6.1 Unit Sampling

6.1.1 Previous Investigations

Because of potential construction in the area, a soil sampling and analysis program was conducted in 1986 and is presented in Appendix F. Twenty-seven boreholes were drilled and samples were collected between depths of 8 and 50 feet. Sixty soil samples were tested for pH, sulfate, fluoride, nitrate, and EP-Toxicity metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). The analysis results are summarized in Table 6-1. Locations of drilling and full sample analysis results are presented in Appendix F.

Concentrations of most metals were low, with levels below or only slightly above detection limits for most samples. Nitrate was elevated in some samples; the highest nitrate concentration was 43 milligrams per liter in extract from the soil.

6.1.2 Recent Sampling

To meet the characterization objectives at LDU CPP-48, one additional boring was drilled and continuously sampled to a depth of 46.5 feet during March 1991. As shown in Figure 6-1, this borehole was located as close as possible to the excess chemical french drain, where chemical concentrations should be highest.

Drilling, sampling, and logging of the surficial soils was conducted in accordance with Golder Associates Technical Procedure TP-1.2-5, "Drilling, Sampling, and Logging of Soils." These procedures conform to, and incorporate those principles and procedures provided by, EPA guidance documents (i.e., EPA, 1987a, 8.1.6.1.3 Hollow Stem Augers, 8.1.6.2 Sampling Techniques, 8.1.6.2.1 Split Spoon Samplers, and 8.1.6.2.2 Thin-walled Tube Samplers; EPA, 1986, 3.1 Drilling Methods, and 3.1.1 Hollow-stem Continuous Flight Auger). Soils were identified by the Drilling Project Engineer (DPE) and Lead Project Geologist (LPG) as specified in Golder Associates Technical Procedure TP-1.2-6, "Field Identification of Soils," (WINCO, 1991a) and classified in accordance with U.S. Department of Agriculture (USDA) soil classification procedures included in Table 4-1 of the Quality Assurance Program Plan (QAPP). All samples were handled in accordance with the chain-of-custody procedures specified in Golder Associates Technical Procedure TP-1.2-23 (WINCO, 1991b).

Hawley Brothers Drilling of Blackfoot, Idaho, was contracted by WINCO to conduct the auguring operations. All work was conducted in accordance with the WINCO Construction Safe Work Permit (CSWP) process. All personnel working at the drill sites wore safety boots, hard hats, and safety glasses. Drilling and sampling activities related to this borehole were conducted from March 26-28, 1991. The borehole log created by the DPE and LPG and is presented in Appendix A.

18" VENT DUCT IN CONCRETE ENCASEMENT

VAULT
AREA

CPP-633

Approximate location
of above ground pipe-
line.

⊕
DRY WELL

⊕
CPP-48 EXCESS
CHEMICAL
DUMP TANK

CONCRETE ENVELOPE
3-1" ELECTRICAL CONDUIT

3"PS
(ABANDONED IN PLACE)

LEGEND

◆ Borehole Location

2"1311-100045

Scale 1" = 10'

0 10 20

Feet

Note:

Not all utilities may be shown.
All locations and dimensions
are approximate.

FIGURE 6-1
SAMPLING LOCATION LDU CPP-48
EG&G/ICPP-48 CLOSURE REPORT/10

TABLE 6-1
SUMMARY OF BASELINE AND MAXIMUM EP-TOXICITY CONCENTRATIONS OF METALS AND
ANIONIC SPECIES AT LDU CPP-48

Constituent	Maximum Concent. mg/l	Range mg/l	Maximum Baseline Concent. mg/l	TCLP Limits mg/l
Arsenic (As)	<0.66	#	<0.53	5.0
Barium (Ba)	1.6	0.1-1.6	1.6	100.0
Cadmium (Cd)	0.052	<0.02-0.052	<0.02	1.0
Chromium (Cr)	0.025	<0.005-0.025	<0.017	5.0
Lead (Pb)	1.16	<0.10-1.16	<0.40	5.0
Mercury (Hg)	<0.04	<0.001-<0.04	<0.04	0.2
Selenium (Se)	<0.002	<0.002	<0.002	1.0
Silver (Ag)	<0.044	<0.005-<0.044	<0.011	5.0
Fluoride (F-)	0.70	0.10-0.70	0.50	- -
Nitrate (NO ₃)	43.0	<0.65-43.0	<0.7	*
Sulfate (SO ₄)	3.40	<0.6-3.40	3.35	- -
pH (Unit of hydronium-ion index which ranged from 1 to 14 with pure water being 7)	9.30	6.52-9.30	9.49	- -

All concentrations (except pH) reported as mg/l in soil extract. From Extraction Procedure (EP) test.

* Drinking water standard is 45 mg/l NO₃.

All As samples were less than daily laboratory standard (0.023, 0.053 and 0.066 mg/l of extract) (WINCO, 1989a).

All soil samples were analyzed for the constituents listed below (detailed lists are included in Appendix B):

- Volatile Organics;
- RCRA Metals, pH, and Nitrite (NO_2) and Nitrate (NO_3); and
- Radionuclides.

In addition to the analyses listed above, the first soil sample at a depth below the bottom of the french drain (i.e., the soil sample representative of the 9- to 11-foot interval) was tested for constituents in a modified Appendix VIII list that included the following (detailed lists are included in Appendix B):

- Herbicides,
- Organophosphorus pesticides,
- Pesticides/Polychlorinated biphenyls (PCBs)
- Metals/pH/Cyanide/Sulfide,
- Radionuclides,
- Radionuclides screening, and
- Dioxin/Furan.

Samples to be screened and analyzed for radionuclides were couriered to Controls for Environmental Pollution, Inc. (CEP), Santa Fe, New Mexico. Pacific Northwest Environmental Laboratory, Inc. (PNELI) of Redmond, Washington, performed analysis for volatile organics and pH/RCRA metals/nitrite and nitrate. Gulf South Environmental Laboratory, Inc. (GSELI) of New Orleans, Louisiana, performed all Appendix VIII analyses except for dioxins and furans, which were analyzed by Southwest Laboratory of Oklahoma, Inc. of Tulsa, Oklahoma; as above, screening and analysis for radionuclides was performed by CEP. Results of the analyses and a discussion of the results is presented in Sections 6.5.2, 6.5.3, and 6.5.4.

The ambient background radioactivity was periodically monitored by Westinghouse Idaho Nuclear Company (WINCO) health physics personnel during the auguring activities conducted during March 1991. They were equipped with hand-held model 61 Ludlum instrumentation to detect alpha activity and model 2A Ludlum counters to detect beta and gamma. In addition, all samples were scanned to detect subsurface radioactive contamination. No radiological contamination was found above background (which ranged from 125 to 175 counts per minute) during routine site characterization field surveys.

The drill rig was decontaminated prior to entering the ICPP. Decontamination consisted of high pressure steam cleaning by the drilling contractor at a WINCO-designated area. Golder Associates personnel visually inspected the drill rig and downhole tools before they were brought on site for grease, hydraulic fluid, and other visible materials that could potentially contaminate the borehole.

All auguring at LDU CPP-48 was conducted using a 4-inch-inside-diameter hollow stem auger. Continuous sampling was conducted ahead of the auger as the hole was advanced in 2- or 3-foot increments. Although extensive drilling and sampling had already been conducted to the top of the basalt in the vicinity of the french drain, drilling had not been conducted directly beneath the french drain. Therefore, soil samples for chemical analysis were collected beginning in the soils immediately adjacent to

the bottom of the french drain (i.e., 9 feet BGL) and at 3-foot intervals. These samples were obtained by driving a 24-inch long, 4-inch-outside-diameter California split spoon sampler containing a 24-inch clear lexan liner. The sampler was advanced by blows from a rig-mounted, cathead-operated 140-pound hammer. The GAI LPG recorded the number of hammer blows required to drive the split spoon in 6-inch increments. The 2-foot split-spoon sampler, with the soil sample retained inside, was then removed from the borehole for processing. The underlying 3-foot sample was recovered with a 5-foot split-barrel sampler (i.e., the lower 3 feet of the barrel retained the sample while the overlying 2 feet was unused), fixed to the auger drill string with the shoe of the sampler extending just beyond the cutting edge of the auger bit. In this way, as the borehole was advanced through the underlying 3 feet, a soil sample was recovered within the split barrel, screened for radiological¹ contamination along its entire length, logged, and discarded according to WINCO procedures. Because the level of radioactivity detected in the soil samples was never greater than 100 counts per minute (cpm) above background (background ranged from 125 to 175 cpm), the soil was considered to be non-radioactive waste and disposed of in a WINCO-approved, plastic-lined 55-gallon drum. For this method of storage and later disposal (based upon analysis results), the containers were labelled, clearly stating where and when the waste was generated. All instrument readings were recorded in the field log book by the LPG or DPE. Thus, the borehole was advanced, alternatively taking 2-foot split-spoon and 3-foot split-barrel samples.

The soils encountered at 41.8 feet BGL were predominantly comprised of silt and were sampled continuously in 2-foot lengths down to the underlying basalt (i.e., 46.5 feet BGL). Aliquots from all of these soil samples were prepared for chemical analysis.

All split-spoon samplers, lexan liners, split barrel sampler, and associated sampling equipment were decontaminated by GAI personnel. Decontamination, as specified in Section 5 of the Technical Work Plan,

¹Screening for radiological contamination during field activities was conducted with a hand-held Ludlum model 61 for alpha and model 2A for beta-gamma radiation.

included the following procedures:

- steam clean equipment with deionized water and wipe dry,
- wipe with a towel or rag dampened with methanol and allow to air dry;
- rinse with deionized water and wipe dry, and
- seal in plastic until needed.

Soil samples for chemical analysis were obtained by driving a split-spoon sampler as described above. Once removed from the borehole, the split-spoon sampler was placed on a clean sheet of plastic on a table inside the exclusion zone. The drilling contractor opened the split-spoon sampler, and the LPG removed the lexan liner containing the sample. The lexan tube containing the sample was screened with a beta-gamma radiation survey instrument on the open ends prior to sealing the tube. All instrument readings were recorded in the field log book by the LPG. The lexan was then capped with soft plastic end caps and the soils logged by the LPG. Once logged, the sample was handed over the drilling exclusion zone barrier for sample preparation in the sample area exclusion zone.

At the preparation area, the sample was prepared by the sample custodian for shipment to the appropriate laboratory.

Samples were processed by laying out a fresh length of protective plastic on the processing table. The caps on each end of the lexan were then removed, and 2 inches of sample material was discarded from the upper and lower end of the lexan tube. Grab samples for volatile organics were immediately poured out of the sampling tube into a 4-ounce amber glass jar. The samples were placed into the container such that little or no headspace was present. The containers were sealed with teflon-lined lids, labelled, wrapped in bubble pack and temporarily placed in a shipping container with coolant for maintaining the samples at 4°C.

The remaining sample material was transferred into a decontaminated stainless steel mixing bowl and mixed thoroughly using decontaminated stainless steel utensils, and any material greater than 3 inches was discarded. An aliquot of the remaining material was transferred into a

4-ounce amber glass jar with a teflon-lined lid to be analyzed for pH, RCRA metals and nitrite, and nitrate. A sample was then prepared in an 8-ounce amber glass jar to be submitted for radionuclide analysis. Field duplicate samples were prepared by placing aliquots in appropriate sample containers and labeling them with unique identification numbers.

The samples were then labeled, wrapped in bubble pack and placed into an appropriate shipping container with the necessary amount of coolant for maintaining the samples at 4°C.

As previously mentioned, the first soil sample beneath the french drain (i.e.; the soil sample representative of the 9- to 11-foot interval) was tested for constituents in a modified Appendix VIII list (See Appendix B for list).

Soil samples obtained from the split barrel samplers were also screened with a beta-gamma radiation survey instrument along their entire length. All instrument readings were recorded in the field log book by the LPG. Once logged, the soil samples were placed in a labeled and lined 55-gallon drum provided by WINCO for their disposal.

All solid wastes generated by the sampling activities for each day were double packaged according to WINCO waste handling practices and removed from the site for disposal in accordance with INEL waste disposal procedures. All liquid wastes generated from the final decontamination of sampling equipment were collected in a catch basin and pumped into 55-gallon drums for disposal.

At the end of the sampling activities for each day, samples were double checked for proper labeling, securely wrapped in bubble pack, and packaged in a cooler with additional blue ice. A chain-of-custody form and security seal were then placed on the cooler. The cooler was transported to Idaho Falls and relinquished to Federal Express to be shipped under chain-of-custody to the appropriate laboratory by overnight service.

6.2 Background Sampling

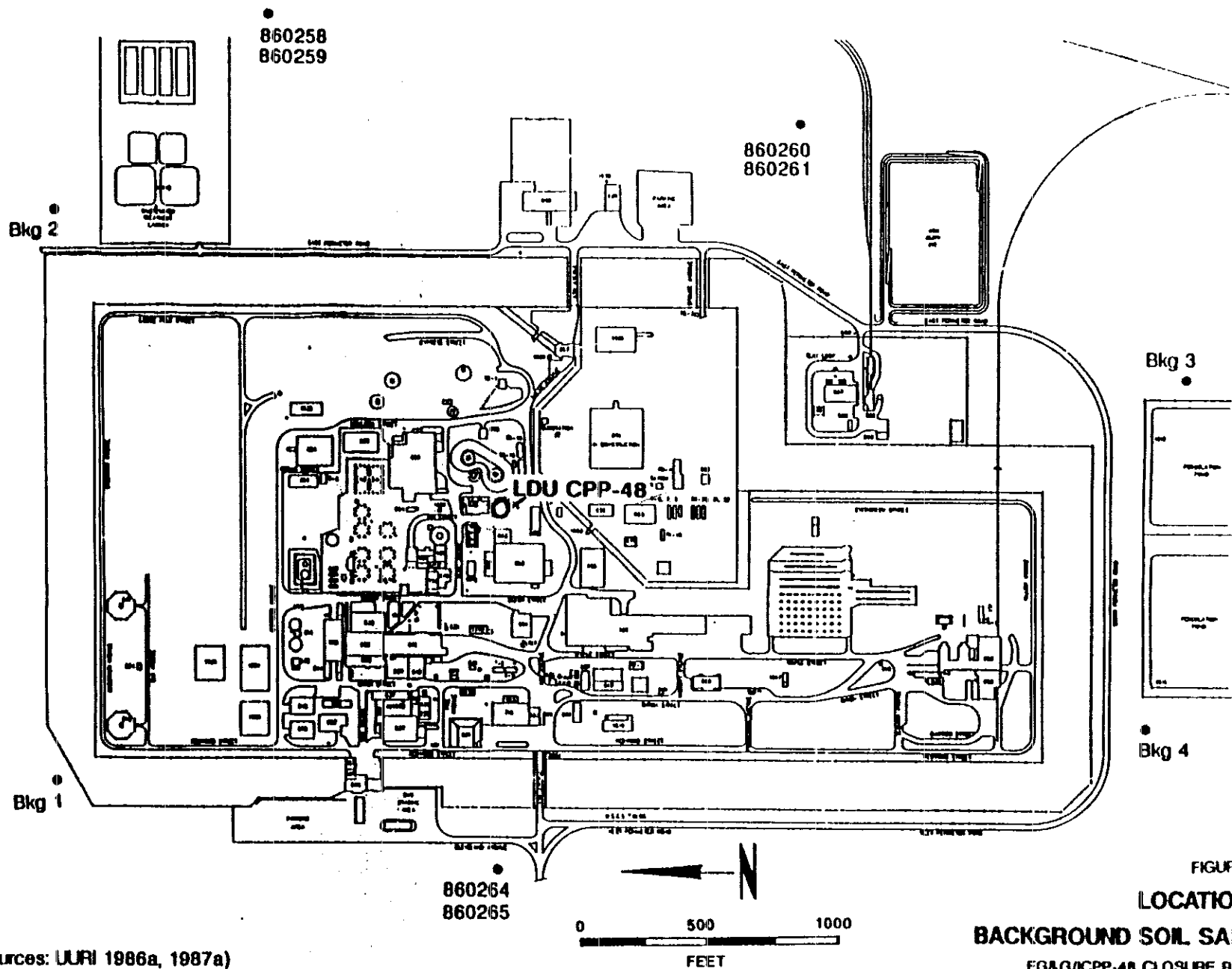
Background data for metal concentrations in soils at the ICPP were obtained by the University of Utah Research Institute (UURI) during two studies conducted in 1986 and 1987. Background soils data were obtained at four locations outside the ICPP during an investigation of the Fuel Processing Restoration (FPR) Warehouse Site in 1986. According to the Quality Assurance Sampling Plan (QASP) for this study, background subsurface soils collected were to be geologically identical to soils in the FPR site sampling area. The QASP indicated the FPR site soils were to be sampled at depths of 6 inches below the pre-fill surface of the area and at 18 to 24 inches below the top of the first horizon samples. The actual depth interval sampled for background soils is noted in the QASP or the final report of the investigation (UURI, 1986a and UURI, 1986b).

In 1987, background data were obtained at three locations outside the ICPP during an investigation of the Chemical Feed and Zirconium Feed Tank Storage Areas. Samples were obtained at surface to 4 inches and at 24 inches at these locations for a total of six samples (UURI 1987a and UURI 1987b).

Locations of background samples from the two studies discussed above are shown in Figure 6-2.

6.2.1 Data Quality Objectives

The precision and accuracy of existing background soils data are discussed in the UURI reports (UURI, 1986 and 1987), and the data quality objectives established for the sampling are reported to have been met. In general, the quality of the data appears to be sufficient to permit its incorporation into a general ICPP background data base; however, the data cannot be completely evaluated without reviewing additional laboratory, Quality Assurance/Quality Control (QA/QC) information beyond that provided with the reports. The reports state that appropriate QA/QC was conducted and that records are maintained at the analytical laboratories. Observations on data quality are summarized below:



(Sources: UURI 1986a, 1987a)

FIGURE 6-2
LOCATIONS OF
BACKGROUND SOIL SAMPLES
 EG&G/CPP-48 CLOSURE REPORT/ID

Golder Associates

- Background soil samples were collected in accordance with standard hand auguring techniques. Laboratory analysis was conducted in accordance with approved EPA methods. These by similar techniques and analyzed by the same EPA methods. This data should be comparable to data collected elsewhere
- Based on the information provided in the UURI reports, the precision and accuracy of the laboratory analysis was within the established control limits and was acceptable for the purposes of the original studies.
- The detection limits reported for the analyses are generally higher than can commonly be achieved with standard EPA analytical methods and may not have provided data that are sufficiently precise to satisfy all potential uses.
- Some difficulty was reported for the lead analyses in the warehouse site study (UURI 1986), but not in the storage areas study (UURI 1987). It is interesting to note that lead was detected in all the background samples collected during the warehouse site study, but was below detection limit in all background samples collected during the storage areas study.
- There was an apparent outlier in the background fluoride data that was not discussed in the UURI report (UURI 1987). The concentration detected in Sample 860264 was 4.0 percent, while the range of values for all other background samples was 0.12 to 0.42 percent.
- With the possible exceptions of lead and fluoride, the background inorganic data appears to be adequate for representing the upper two feet of soils unimpacted by ICPP activities.

6.2.2 Chemical Parameters

Table 6-2 presents the background data for inorganic constituents obtained during the two investigations conducted by UURI. Both

TABLE 6-2

BACKGROUND CONCENTRATIONS OF METALS AND NITRATE
IN SOILS SAMPLED FROM OUTSIDE THE ICPP FACILITY AND
ONE-SIDED NORMAL TOLERANCE INTERVALS(1)

Results in PPM									
Sample	Arsenic	Barium	Cadmium	Chromium	Lead (2)	Mercury	Selenium	Silver	Nitrate
Bkg 1	5.6	200	<5	25	12	0.043	0.484	<2	
Bkg 2	5.1	270	<5	32	16	0.019	0.405	<2	
Bkg 3	6.5	270	<5	33	17	0.027	0.467	<2	
Bkg 4	7	250	<5	34	12	0.028	0.341	<2	
258	5.6	280	<5	28	<10	0.025	0.113	<2	0.86
259	7.6	380	<5	26	<10	0.057	0.252	<2	0.72
260	6.4	240	<5	28	<10	0.023	0.695	<2	0.41
261	6.2	220	<5	18	<10	0.03	0.236	<2	0.43
264	6	230	<5	28	<10	0.021	0.102	<2	0.27
265	7.6	210	<5	20	<10	0.046	0.227	<2	0.25
Average (x) Std.	6.4	255	<5	27	9	0.032	0.332	<2	0.49
Dev. (SD)	0.8	51	--	5	5	0.013	0.184	--	0.25
Background UTL	8.7	403	--	42	24	0.070	0.868	--	1.42

1. All samples were collected by the University of Utah Research Institute, Salt Lake City, UT using EPA methods. Samples Bkg 1-4 were collected for the FPR Warehouse Site, and 258-265 were collected for the Chemical Storage and Zirconium Feed Tank Storage Areas. All analyses are total constituent analyses and are reported on a dry weight basis.
2. Where lead values are listed below detection limit a value of one-half the detection limit was used in the calculation of the average, standard deviation and tolerance limit values.
3. The background one-sided upper tolerance interval (UTL) is $(x) + K \cdot SD$, where the K value (tolerance factor) for sample size $n = 10$ is equal to 2.911 with a probability level $\gamma = 0.95$ and coverage $P = 95\%$

investigations included testing for the eight RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, silver, and selenium). In addition, background data for nitrate, fluoride, aluminum and zirconium was obtained during the investigation of the Chemical Storage and Zirconium Feed Tank Storage Area.

Analyses were also conducted for volatile organic compounds (EPA Method 8240) and semi-volatile organic compounds (EPA Method 8270) on the four background samples collected during the FPR Warehouse Site investigation (UURI, 1986). No organic compounds were detected. However, the reported detection limits for the organic compounds (1 to 10 ppm) were higher than commonly achievable (5 to 500 ppb) using the methods referenced. These high detection limits would have the effect of screening out compounds present at low concentrations.

6.2.3 Number of Samples

The number of samples available from existing background data for each of the types of parameters is presented below:

- Volatile Organic Compounds - 4
- Semi-volatile Organic Compounds - 4
- RCRA Metals - 10
- Other (nitrate, fluoride, aluminum, and zirconium) - 6

6.3 Quality Assurance/Quality Control for CPP-48 Data

QA/QC procedures were implemented during the sampling and analysis program. These procedures are summarized below:

- Three field blank samples (two trip blanks and one equipment blank) were collected and analyzed to monitor potential contamination that may have been introduced from the decontamination procedures and shipping and handling process.

- A field duplicate sample was not collected during this sampling event.
- A systems audit was conducted at PNELI following receipt of the analytical data.

Quality control samples represented 28 percent of the total number of samples collected.

QA/QC procedures for previous sampling and analysis conducted in 1986 in Appendix F.

6.3.1 Blanks

Trip blanks are included in each sample shipment container in which volatile organic samples are shipped as a means of detecting the introduction of organic contaminants to the samples through sample handling, storage, preparation and analysis. The equipment blank sample is submitted as a means of detection the introduction of contamination to the samples from inadequate equipment decontamination or from sample handling and preparation procedures. The equipment blank is prepared by decontaminating the sample processing equipment as described in Section 9 of the Technical Work Plan, Volume II (Golder Associates Inc., 1991b), followed by a final rinse with deionized water and collection of the rinse in proper containers. Laboratory method blanks are prepared and analyzed with the samples as a means of detecting the introduction of contaminants into the samples as a result of laboratory procedures. As recommended by the EPA (EPA 1988a and EPA 1988b), sample results that are less than or equal to 5 times (10 times for the common laboratory contaminants) the concentration of the compound or analyte in an associated blank are qualified as undetected (U) at the reported concentration during data validation.

6.3.1.1 Volatile Organic Analysis Blanks

Trip blanks were submitted for volatile organic analysis in each sample shuttle (i.e., one trip blank with the samples shipped to PNELI and one trip blank with the sample shipped to GSELI). No target compounds were found in the trip blank shipped to PNELI. Acetone (4 BJ) (B indicates it was also detected in the trip blank, and J indicates this value was an estimate) was detected in the trip blank shipped to GSELI. Methylene chloride, acetone, 1,4-dioxane, and isobutyl alcohol were detected in the laboratory blanks (8, 9, 190, and 37 $\mu\text{g/L}$, respectively). The source of this laboratory blank contamination is most likely the laboratory. Methylene chloride and acetone were detected in the sample submitted for Appendix VIII analysis, but at concentrations less than 10 times the concentration in the laboratory blanks; therefore, the sample results were requalified as undetected (U) at the concentration reported.

Acetone (46 $\mu\text{g/L}$), carbon disulfide (1J $\mu\text{g/L}$), and 2-butanone (8J $\mu\text{g/L}$) were detected in the equipment blank submitted with the seven soil samples shipped to PNELI. These compounds were not detected in any of the soil samples, suggesting the laboratory as the most likely source of the contamination. No qualification of the data results was necessary due to the equipment blank contamination.

6.3.1.2 Metals Analysis Blanks

The equipment blank sample was submitted to PNELI for metals analyses. No analytes were detected above the instrument detection limit in the equipment blank.

6.3.1.3 Radiochemical Analysis Blanks

One aqueous equipment blank was submitted for radiochemical analysis to CEP. No radiochemical analytes were detected above the sample quantitation limit as listed in Table 6-3-1.

6.3.2 Duplicate Sample Analysis

A field duplicate sample was not collected during this sampling event, however, the laboratories performed duplicate and/or matrix spike/matrix spike duplicate analysis on samples CPP48-1-10 and CPP48-1-15. The results of these analyses are presented in Table 6-3-2, note that only the analytes for which both results were greater than the detection limit are reported in the table.

The relative percent difference (RPD) for the arsenic results reported for sample CPP48-1-10 exceeds the control limit of $\pm 35\%$ established for soil samples by the EPA. The arsenic result for this sample was qualified as an estimate. The relative percent difference for the 1,2,4-trichlorobenzene and acenaphthene also exceeded the established control limits, however, neither compound was detected in the sample.

The RPD for the barium results for sample CPP48-1-15 exceeded the $\pm 35\%$ control limit, however, because the sample results were less than five times the contract required detection limit (CRDL), the control limit that applies is $\pm 2X$ CRDL (± 43.5 mg/Kg). The barium results fall within this control limit and the barium results do not require qualification.

TABLE 6-3-1

EQUIPMENT BLANK RADIOCHEMICAL ANALYSIS RESULTS
LAND DISPOSAL UNIT, CPP-48
(Results in pCi/L)

RADIONUCLIDE	ANALYSIS RESULT
Antimony-125	18. U
Cerium-144	15. U
Cobalt-58	9. U
Cobalt-60	8. U
Cesium-134	10. U
Cesium-137	5. U
Iodine-129	5. U
Neptunium-237	15. U
Ruthenium-103	21. U
Ruthenium-106	10. U
Strontium-90	0.5 U

U - Radionuclide undetected at the reported concentration.

TABLE 6-3-2

DUPLICATE SAMPLE ANALYSIS RESULTS
 LAND DISPOSAL UNIT, CPP-48
 (Inorganic results in mg/Kg except pH in SU)

Sample ID: CPP48-1-10

METALS	SAMPLE RESULT	DUPLICATE SAMPLE RESULT	RELATIVE PERCENT DIFFERENCE
Arsenic	3.0778	4.4167	-35.7
Barium	61.2719	61.6770	- 0.7
Chromium	17.3673	18.8882	- 8.4
Copper	10.4552	11.9627	-13.4
Lead	6.2958	8.6465	-31.5
Nickel	18.8746	19.1553	- 1.5
Vanadium	17.9738	18.6087	- 3.5
Zinc	45.1958	51.1553	-12.4
CONVENTIONAL PARAMETERS			
Chloride	2.77	3.69	-28.5
Nitrate/Nitrite	3.84	5.06	-27.4
pH	8.42	8.31	1.3
Sulfate	131.3	169.4	-25.3
Sulfide	1.56	1.53	4.5

TABLE 6-3-2 (Cont.)

DUPLICATE SAMPLE ANALYSIS RESULTS
 LAND DISPOSAL UNIT, CPP-48
 (Results in ug/Kg)

Sample ID: CPP48-1-10

VOLATILE ORGANIC COMPOUND	SAMPLE RESULT	DUPLICATE SAMPLE RESULT	RELATIVE PERCENT DIFFERENCE
1,1-Dichloroethane	56.9	56.1	2
Trichloroethene	59.0	56.5	4
Benzene	52.1	48.5	8
Toluene	57.0	55.5	3
Chlorobenzene	53.7	54.4	-1
SEMIVOLATILE ORGANIC COMPOUND			
Phenol	6750	5530	20
2-Chlorophenol	6870	5570	20
1,4-Dichlorobenzene	3210	2510	24
N-Nitroso-di-n-prop. (1)	3690	2870	25
1,2,4-Trichlorobenzene	3580	2720	28
4-Chloro-3-Methylphenol	6750	5460	21
Acenaphthene	3820	2990	25
4-Nitrophenol	7400	5880	23
2,4-Dinitrotoluene	3560	2670	28
Pentachlorophenol	1910	2120	-11
Pyrene	2980	2330	25

(1) N-Nitroso-di-n-propylamine

TABLE 6-3-2 (Cont.)

DUPLICATE SAMPLE ANALYSIS RESULTS
LAND DISPOSAL UNIT, CPP-48
(Results in uw/Kg)

Sample ID: CPP48-1-10

PESTICIDE/PCB COMPOUND	SAMPLE RESULT	DUPLICATE SAMPLE RESULT	RELATIVE PERCENT DIFFERENCE
gamma-BHC (Lindane)	28.2	27.9	1
Heptachlor	28.2	25.1	12
Aldrin	20.7	17.1	20
Dieldrin	71.6	62.7	13
Endrin	75.9	61.9	22
4,4'-DDT	72.2	62.5	14
ORGANOPHOSPHATE PESTICIDE			
Thionazin	299	309	-3
Sulfotepp	323	330	-2
Phorate	264	265	0
Dimethoate	503	523	-4
Disulfoton	285	275	4
Methyl parathion	427	417	2
Parathion	347	335	3
Famphur	377	370	2
HERBICIDE COMPOUND			
2,4-D	1108	1155	-4
2,4,5-TP (Silvex)	220	227	-3
2,4,5-T	206	212	-3

TABLE 6-3-2 (Cont.)

DUPLICATE SAMPLE ANALYSIS RESULTS
 LAND DISPOSAL UNIT, CPP-48
 (Inorganic results in mg/Kg except pH in SU)
 Organic results in ug/Kg)

Sample ID: CPP48-1-15

VOLATILE ORGANIC COMPOUND	SAMPLE RESULT	DUPLICATE SAMPLE RESULT	RELATIVE PERCENT DIFFERENCE
1,1-Dichloroethene	54.1	51.8	5
Trichloroethene	53.0	53.5	0
Benzene	53.5	54.6	-3
Toluene	53.5	54.2	-2
Chlorobenzene	54.8	55.5	-1
METALS			
Arsenic	5.6914	6.6752	15.9
Barium	55.8758	37.4635 B	39.5
Chromium	20.3950	21.0651	3.2
Lead	8.6913	6.9861	21.8
CONVENTIONAL PARAMETERS			
Nitrate	4.40	4.68	6.2
pH	6.74	6.72	0.3

6.4 Data Validation

Sample analysis results were reviewed and validated in accordance with Section 8 of the Technical Work Plan, Volume II - Quality Assurance Project Plan (Golder Associates Inc., 1991b) and with the EPA data validation guidelines (EPA, 1988a EPA, 1988b).

Holding times for soil samples have not yet been established, however, all soil samples were analyzed within the recognized advisory holding times specific to the extraction or analyses (i.e., 14 days for volatile organics, 28 days for mercury, etc.).

Selenium analysis results for the samples collected at the 30-, 35-, 40-, and 45-foot depths were qualified as estimates (UJ) due to low recovery (<85 percent) of the analytical spike.

Beryllium and cobalt sample results for the sample collected at the 10 foot depth and submitted for Appendix VIII analysis were qualified 'R', unusable due to an incomplete analysis by the laboratory.

Antimony, cadmium and selenium sample results for the sample collected at the 10 foot depth and submitted for Appendix VIII analysis were qualified 'U', undetected at the reported concentration due to the analyte being detected in an associated blank at a concentration which was not five times less than the concentration found in the sample.

Arsenic, lead and silver sample results for the sample collected at the 10 foot depth and submitted for Appendix VIII analysis were qualified 'J', estimated due to the matrix spike percent recovery exceeding the control limits (75-125%).

The copper sample result for the sample collected at the 10 foot depth and submitted for Appendix VIII analysis was qualified 'J', estimated due to the percent difference (%D) for the ICP serial dilution result exceeding the control limits ($\pm 10\%$).

Copies of all data validation reports have been included in the appropriate appendix.

6.5 Data Evaluation

6.5.1 Background Data

The background data obtained from the UURI investigations is compared with CPP-48 results in Table 6-5-1. This table includes the one-sided upper tolerance limit (UTL) for the background data assuming a normal distribution with 95 percent coverage of the samples at a 95 percent confidence coefficient. Tolerance limits establish a concentration range that is constructed to contain a specified proportion of coverage, P%, of the population with a specified confidence coefficient, Y (EPA, 1989a).

There are potential limitations that should be considered in the use of the data obtained by UURI for determining action levels based on background concentrations. These limitations include the following:

- All UURI background data were obtained in the shallow surface soils (0 to 24 inches) and may not be representative of other soil types or horizons;
- Many areas of the ICPP have been graded and/or filled. Background soils sampled by UURI may not be representative of soils used for fill at the ICPP; and
- There may be widespread elevated concentrations of certain constituents above natural background at the ICPP from both point and non-point sources as a result of site activities.

Table 6-5-1

INORGANIC SAMPLE ANALYSIS RESULTS
 LAND DISPOSAL UNIT CPP-48
 (Results in mg/Kg, except pH in Standard Units [SU])

Sample Number	Depth (ft)	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	pH	Nitrite	Nitrate
CPP48-1-10 ¹	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CPP48-1-15	15	5.7	55.9	1.1 U	20.4	8.7	0.09 U	0.63 U	2.2 U	6.72	0.578	4.68
CPP48-1-20	20	6.8	114.0	1.1 U	13.6	7.7	0.10 U	0.65 U	2.2 U	6.83	0.506 U	5.71
CPP48-1-25	25	5.7	74.0	1.0 U	18.4	6.5	0.10 U	0.60 U	2.1 U	8.07	0.487 U	0.974
CPP48-1-30	30	6.5	99.8	1.0 U	16.3	10.0	0.09 U	0.61 U	2.1 U	8.15	0.514 U	0.705
CPP48-1-35	35	4.4	88.5	1.1 U	13.3	4.6	0.08 U	0.63 U	2.1 U	8.26	0.590	0.522 U
CPP48-1-40	40	4.6	111.0	1.0 U	20.8	8.4	0.09 U	0.62 UJ	2.0 U	6.86	0.529	0.529 U
CPP48-1-45	45	13.2	314.0	1.2 U	39.6	23.9	0.12 U	0.72 UJ	2.4 U	6.95	0.590	0.837
CRQL		2.0	40.	1.0	2.0	1.0	0.10	1.0	2.0	NA	NA	NA
Background UTL		8.7	403.	5.0	42.0	24.0	0.07	0.9	2.0	NA	NA	1.42

CRQL - Contract Required Quantitation Limit

J - The associated value is an estimated quantity

U - Analyte was undetected at the concentration reported

UTL - Upper Tolerance Limit

¹Sample CPP48-1-10 was submitted to the laboratory for Appendix VIII analysis.
 The results are unavailable at this time.

It is not appropriate to establish action levels for LDUs based on natural background if there are widespread elevated concentrations of constituents at the ICPP unrelated to releases from the LDUs.

6.5.2 Results of Inorganic Analysis for LDU CPP-48

6.5.2.1 RCRA Metals, pH, and Nitrate

Sample results for the Inorganic Analysis and General Chemistry Analysis, as reported by the laboratory are included in Appendix C. Sample results for RCRA metals, pH, and nitrate are shown in Table 6-5-1. Also shown on this table are the UTL for the background soils described in Section 6.2. Arsenic was the only metal detected above the background UTL and was found to exceed the background UTL in only the sample collected at the 45-foot depth (13.2 mg/Kg). Nitrate was found to exceed the background UTL of 1.42 mg/Kg at depths of 15 and 20 feet. Concentrations of 4.68 and 5.71 mg/Kg were found at those depths, respectively. The pH value was either around 6.8 or 8.1 depending on whether the sample was a calcareous or non-calcareous soil sample.

6.5.2.2 Appendix VIII Inorganic Analysis

Sample results for the Appendix VIII Inorganic Analyses, performed on the sample collected at the 10 foot depth, as reported by the laboratory are included in Appendix E. Validated sample results are presented in Table 6-5-2 and data validation reports are included with the data in Appendix E. Nitrate was found at a concentration of 3.84 mg/Kg which exceeds the background UTL of 1.42 mg/Kg. All other analyte results for which background data exists were below the calculated UTL as reported in Table 6-5-1.

Sample results for the Volatile Organic Analysis, as reported by the laboratory, and the data validation report are included in Appendix D. The samples contained no detectable levels of the target compounds for this analysis.

TABLE 6-5-2

APPENDIX VIII INORGANIC SAMPLE ANALYSIS RESULTS
 LAND DISPOSAL UNIT CPP-48
 (Results in mg/Kg except pH in SU)

Sample ID: CPP48-1-10, collected at 10 foot depth

ANALYTE/PARAMETER	CONCENTRATION	ANALYTICAL METHOD
Antimony		
Arsenic	2.2 U	6010 ¹
Barium	3.1 J	7060 ¹
Beryllium	61.3	6010 ¹
Cadmium	0.16 R	6010 ¹
Chromium	0.27 U	6010 ¹
Cobalt	17.4	6010 ¹
Copper	3.9 R	6010 ¹
Lead	10.5 J	6010 ¹
Mercury	6.3 J	7421 ¹
Nickel	0.19 U	7471 ¹
Selenium	18.9	6010 ¹
Silver	0.34 U	7740 ¹
Thallium	0.12 UJ	6010 ¹
Vanadium	0.76 U	7841 ¹
Zinc	18.0	6010 ¹
	45.2	6010 ¹
Chloride		
Cyanide, Total	2.77	
Fluoride	2.5 U	325.3 ²
Nitrate/Nitrite	5.20	9010 ¹
pH	3.84	340.1 ²
Phenols	8.42	353.3 ²
Sulfate	0.45 U	150.1 ²
Sulfide	131.3	420.1 ²
Tin	1.56	375.4 ²
	0.03	376.2 ²
		282.1 ²

¹ - Test Methods for Evaluating Solid Waste: Physical/Chemical Methods: SW-846 3rd Edition Proposed Update, Environmental Protection Agency, Washington D.C.

² - Methods for Chemical Analysis of Water and Wastes, EPA 600/4-79-020, United States Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.

U - Analyte tested for but not detected at the concentration reported.

R - Analyte tested for but result was determined to be unusable during the validation process.

J - The reported result is an estimated value.

6.5.3 Results of Organic Analysis for LDU CPP-48

6.5.3.1 Results of Volatile Organic Analysis (Non-Appendix VIII)

Since no RCRA hazardous wastes were detected no basis exists for remediation or post-closure of this site in accordance with RCRA. LDU CPP-48 should be clean closed under RCRA.

6.5.3.2 Appendix VIII Organic Analysis

Sample CPP48-1-10, collected at the 10 foot depth was submitted for Appendix VIII analyses. Sample results and data validation summaries for the Volatile, Semivolatile, Pesticide, Dioxin/Furan and Herbicide Analyses are included in Appendix E. No detectable levels of the target compounds for these analyses were found in this sample.

6.5.4 Results of Radionuclide Analysis

Sample results for radiochemical analysis are presented in Table 6-5-3. A total of eight soil samples and one equipment blank were submitted to CEP Inc. for analysis. Cesium-137 was detected in one sample, CPP48-1-15 collected at a depth of 15 feet, at a concentration of 3.3 ± 0.1 pCi/gram. Strontium-90 was detected in three samples at depths of 10 feet, 20 feet and 45 feet at concentrations of 0.18 ± 0.09 pCi/gram, 0.12 ± 0.09 pCi/gram and 0.26 ± 0.10 pCi/gram respectively. These values are slightly above detection limits.

Due to the depth detected and the fact that no radiological contamination was detected above background (which range from 125 to 175 counts per minute) during routine site characterization surveys, the Cs-137 and Sr-90 do not pose a threat to human health, safety, and the environment.

TABLE 6-5-3

RADIOCHEMICAL ANALYSIS RESULTS
 LAND DISPOSAL UNIT, CPP-48
 (Results in pCi/L)

SAMPLE NUMBER:	DEPTH (ft)	ANTIMONY -125	CERIUM -144	CESIUM -134	CESIUM -137
CPP48-1-10	10	0.03 U	0.05 U	0.08 U	0.06 U
CPP48-1-15	15	0.03 U	0.05 U	0.08 U	3.3 ± 0.1
CPP48-1-20	20	0.03 U	0.05 U	0.08 U	0.2 U
CPP48-1-25	25	0.03 U	0.05 U	0.08 U	0.1 U
CPP48-1-30	30	0.03 U	0.05 U	0.08 U	0.09 U
CPP48-1-35	35	0.03 U	0.05 U	0.08 U	0.07 U
CPP48-1-40	40	0.03 U	0.05 U	0.08 U	0.06 U
CPP48-1-45	45	N/A	N/A	N/A	N/A

SAMPLE NUMBER:	DEPTH (ft)	COBALT -58	COBALT -60	IODINE -129	NEPTUNIUM -237
CPP48-1-10	10	0.09 U	0.07 U	0.05 U	0.1 U
CPP48-1-15	15	0.09 U	0.07 U	0.05 U	0.1 U
CPP48-1-20	20	0.09 U	0.07 U	0.05 U	0.1 U
CPP48-1-25	25	0.09 U	0.07 U	0.04 U	0.05 U
CPP48-1-30	30	0.09 U	0.07 U	0.05 U	0.05 U
CPP48-1-35	35	0.09 U	0.07 U	0.05 U	0.05 U
CPP48-1-40	40	0.09 U	0.07 U	0.05 U	0.05 U
CPP48-1-45	45	N/A	N/A	N/A	N/A

7.0 Discussion of Results

Because nitric acid was disposed of in the french drain, the presence of nitrates in the soil is not unexpected. Calcium carbonate in the soil neutralizes the hydrogen ion concentration in the nitric acid, essentially releasing the nitrates to the soil matrix in the form of calcium nitrate.

Arsenic may exist in several oxidation states in the subsurface depending primarily on the redox potential. Under more oxidizing conditions, arsenite (AsO_3^{-3}) and arsenate (AsO_4^{-3}) will likely predominate. Both these forms are anionic in aqueous solution, and, therefore, tend to be relatively mobile. The arsenite form is more toxic and considerably more soluble and mobile than the arsenate form. Absorption of arsenite and arsenate in soils will generally tend to increase with decreasing pH. Mobility of a species is dependent on the pH of the soil and availability of iron, calcium and arsenic for formation of immobile precipitates.

Therefore, based on the soil geochemistry and known acidic nature of the waste disposed of at this site, it can be concluded that the arsenic concentration at 13.2 ppm at 45 feet is not related to disposal practices at this site.

Secondly, arsenic at twice background would be expected in clay layers at the basalt/sediment interface. This phenomenon can be scientifically explained based on the alkaline nature of the surface soils at the INEL.

No radiological contamination was found at significant levels above background at this site and therefore is not a concern.

8.0 CLOSURE PROCEDURES

No basis exists for remediation or post-closure of this site in accordance with RCRA. Therefore, LDU CPP-48 should be clean closed under RCRA.

9.0 POST-REMOVAL SAMPLING AND ANALYTICAL PROCEDURES

No post-removed sampling and analysis is required since no hazardous wastes/constituents were detected.

10.0 CLOSURE QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

All sampling and analysis activities were performed in accordance with sound Quality Assurance/Quality Control (QA/QC) procedures. These procedures are outlined in the Quality Assurance Project Plan for Drilling and Sampling Activities at Land Disposal Units CPP-37, CPP-40, CPP-47, CPP-48 and CPP-63 and Solid Waste Management Units CPP-36 (Golder Assoc. 1991b). This plan establishes appropriate QA program controls for conducting unit characterizations at ICPP LDUs and SWMUs. The plans incorporate all applicable requirements of ANSI/ASME NQA-1, Quality Assurance Program Requirements for Nuclear Facilities, which is defined as the preferred standard for all projects conducted at nuclear facilities by U.S. Department of Energy (DOE) Order 5700.6B, Quality Assurance. In addition, the QA Project Plan was written in compliance with the guidelines provided by Interim Guidelines for Preparation of Quality Assurance Project Plans (QAMS/005). Interpretations of QAMS/005 and expanded guidance provided by other applicable EPA guidance documents were considered during the preparation of the QA Project Plan.

11.0 CLOSURE CERTIFICATION

Closure certification should not be required if the site is clean closed.

12.0 AREA RESTORATION

Area restoration will be performed if the french drain is removed. Area restoration, at that time, will include decontamination and/or removal of the french drain. The area would be replaced with clean fill and the site regraded to as near original topography as feasible.

13.0 SCHEDULE OF ACTIVITIES

No further activities are required if the site is clean closed.

14.0 POST-CLOSURE CARE

No hazardous constituents were detected. Post closure requirements under RCRA (40 CFR 265.117 - 120) and the COCA will not be required for the soils in the vicinity of the dump french drain.

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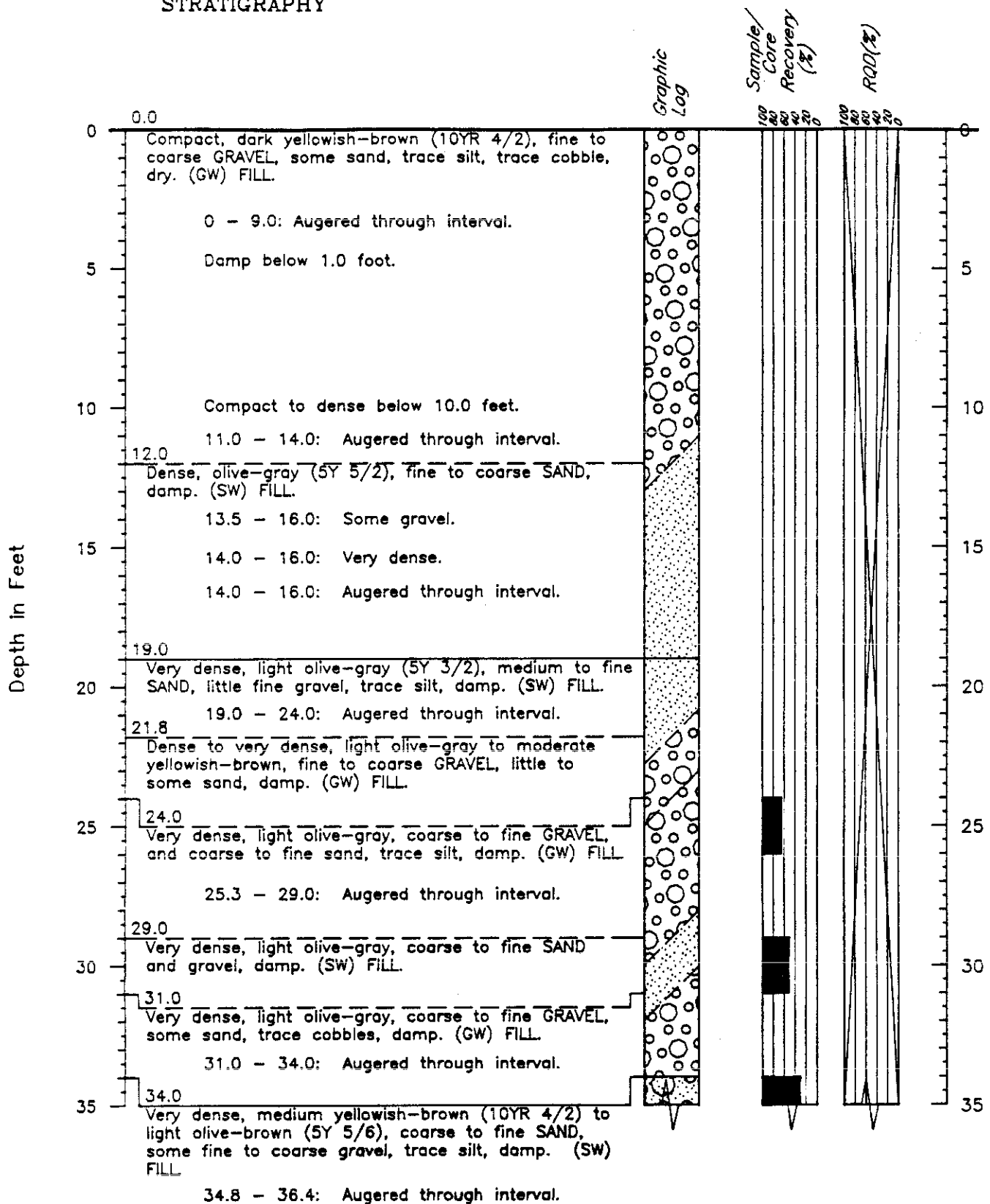
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APPENDIX A
BOREHOLE LOG

STRATIGRAPHY



Notes:

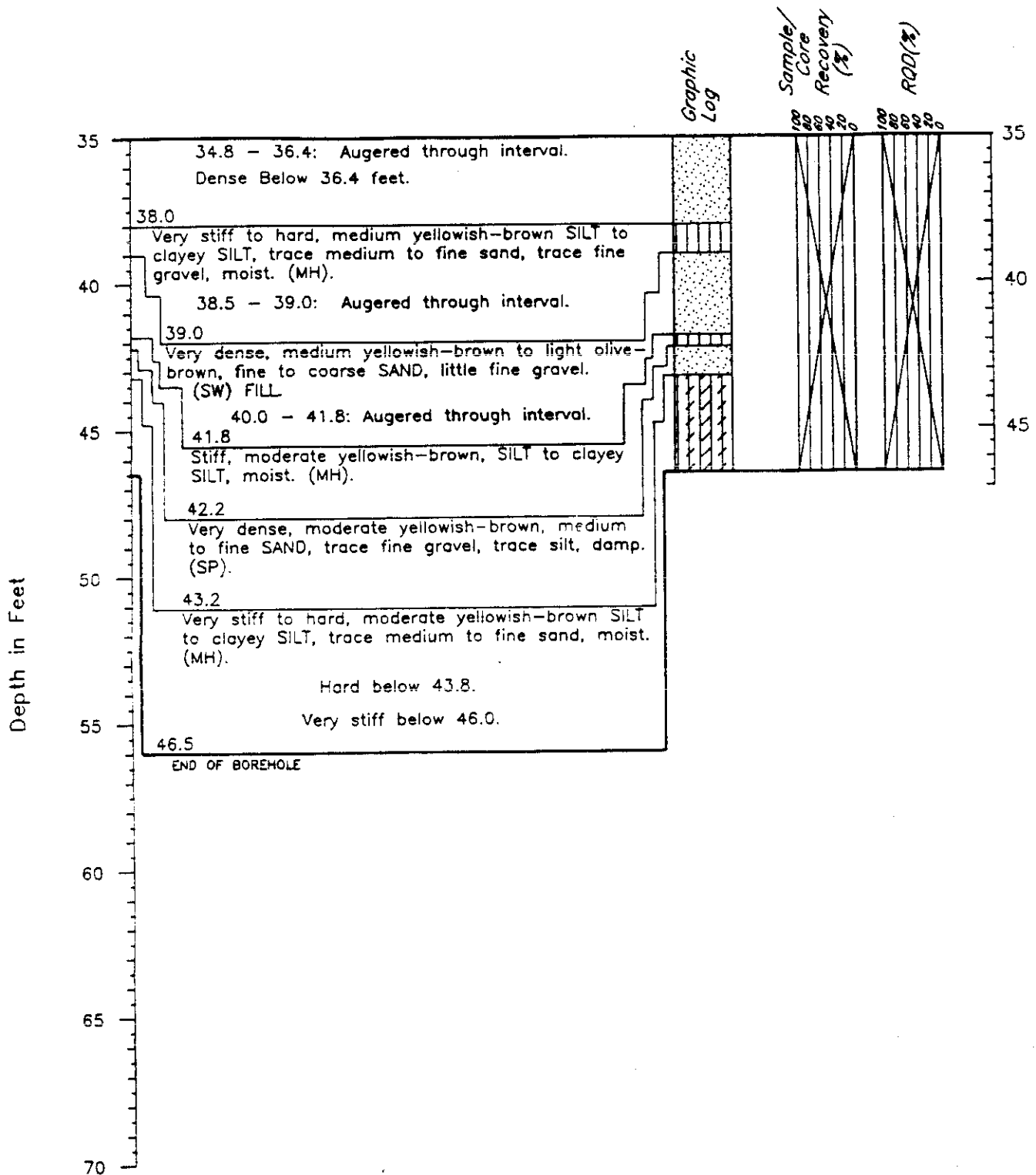
- 1.) All ALLUVIUM samples were surveyed by WINCO HPs and were at background levels.

FIGURE A-1
SHEET 1 OF 2

GENERALIZED BOREHOLE LOG - SITE CPP 48

EG&G/ICPP-48 CLOSURE REPORT/ID

STRATIGRAPHY



Notes:

- 1.) All ALLUVIUM samples were surveyed by WINCO HPs and were at background levels.

FIGURE **A-1**
SHEET 2 OF 2

GENERALIZED BOREHOLE LOG - SITE CPP 48

EG&G/ICPP-48 CLOSURE REPORT/ID

APPENDIX B
LIST OF COMPOUNDS ANALYZED

TABLE B-1
TARGET COMPOUND/ANALYTE LIST
LAND DISPOSAL UNIT CPP-48

CONSTITUENT
pH Nitrates and Nitrites
METALS Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver
ORGANICS ¹ 4-methyl-2-pentanone
RADIONUCLIDES Americium 241 Antimony 125 Cerium 144 Cesium 134, 137 Cobalt 60, 58 Iodine 129 Neptunium Plutonium 238, 239, 240 Ruthenium 103, 106 Strontium 90 Uranium 234, 235, 238

¹ EPA method 8240 was used to detect 4-Methyl-2-pentanone. It will also detect volatile organic compounds.

Table B-2

Analytical Categories, Analytes of Interest, Reference Methods
and Detection Limit Requirements

Appendix VIII Volatile Organics (EPA Method CLP-VOA, EPA Method 8240)

<u>Compound</u>	<u>Detection Limit Goals</u>	
	<u>Water, $\mu\text{g/L}$</u>	<u>Soil, $\mu\text{g/Kg}$</u>
1,1-Dichloroethylene	5	5
1,1-Dichloroethane	5	5
1,1,1-Trichloroethane	5	5
1,1,1,2-Tetrachloroethane	5	5
1,1,2-Trichloroethane	5	5
1,1,2,2-Tetrachloroethane	5	5
1,2-Dibromoethane	5	5
1,2-Dibromo-3-chloropropane	5	5
1,2-Dichloropropane	5	5
1,2-Dichloroethane	5	5
1,2,3-Trichloropropane	5	5
2-Picoline	5	5
2-Hexanone	10	10
3,3'-Dichlorobenzidine	20	20
4-Methyl-2-pentanone	10	10
Acetone	10	10
Acrolein	20	20
Acrylonitrile	20	20
Allyl chloride	100	100
Benzene	5	5
Bromodichloromethane	5	5
Bromoform	5	5
Carbon disulfide	5	5
Carbon tetrachloride	5	5
Chlorobenzene	5	5
Chloroethane	10	10
Chloroform	5	5
cis-1,3-Dichloropropene	5	5
Dibromochloromethane	5	5
Dichlorodifluoromethane	5	5
Ethyl methacrylate	5	5
Ethyl benzene	5	5
Methacrylonitrile	5	5
Methyl bromide	10	10
Methyl chloride	10	10
Methyl ethyl ketone	10	10
Methyl iodide	5	5
Methylene bromide, Dibromomethane	5	5
Methylene chloride, Dichloromethane	5	5

Table B-2, Continued
Page 2 of 9

Appendix VIII Volatile Organics (EPA Method CLP-VOA, EPA Method 8240)

<u>Compound</u>	<u>Detection Limit Goals</u>	
	<u>Water, $\mu\text{g/L}$</u>	<u>Soil, $\mu\text{g/Kg}$</u>
Methyl methacrylate	5	5
Propionitrile; Ethyl cyanide	5	5
Styrene	5	5
Tetrachloroethylene	5	5
Toluene	5	5
trans-1,4-Dichloro-2-butene	5	5
trans-1,3-Dichloropropene	5	5
Trichloroethylene	5	5
Trichlorofluoromethane	5	5
Vinyl acetate	10	10
Vinyl chloride	10	10
Xylene (total)	5	5

Appendix VIII Semivolatiles (EPA Method CLP-SV, EPA Method 8270)

<u>Compound</u>	<u>Detection Limit Goals</u>	
	<u>Water, $\mu\text{g/L}$</u>	<u>Soil, $\mu\text{g/Kg}$</u>
1-Naphthylamine	20	660
1,2-Dichlorobenzene	10	330
1,2,4-Trichlorobenzene	10	330
1,2,4,5-Tetrachlorobenzene	10	330
1,3-Dichlorobenzene	10	330
1,4-Naphthoquinone	10	330
1,4-Dichlorobenzene	10	330
2-Methylnaphthalene	10	330
2-sec-Butyl-4,6-dinitrophenol	50	1600
2-Chlorophenol	10	330
2-Naphthylamine	10	330
2-Picoline	20	660
2-Chloronaphthalene	10	330
2-Acetylaminofluorene; 2-AAF	10	330
2,3,4,6-Tetrachlorophenol	10	330
2,4-Dinitrophenol	50	1600
2,4-Dinitrotoluene	10	330
2,4-Dimethylphenol	10	330
2,4-Dichlorophenol	10	330
2,4,5-Trichlorophenol	10	330

Table B-2, Continued
Page 3 of 9

Appendix VIII Semivolatile Organics (EPA Method CLP-SV, EPA Method 8270)

<u>Compound</u>	<u>Detection Limit Goals</u>	
	<u>Water, $\mu\text{g/L}$</u>	<u>Soil, $\mu\text{g/Kg}$</u>
2,4,6-Trichlorophenol	10	330
2,6-Dichlorophenol	10	330
2,6-Dinitrotoluene	10	330
3-Methylcholanthrene	10	330
3,3'-Dichlorobenzidine	50	1600
3,3'-Dimethylbenzidine	20	660
4-Chlorophenyl phenyl ether	10	330
4-Bromophenyl phenyl ether	10	330
4-Nitroquinoline 1-oxide	10	330
4-Aminobiphenyl	20	660
4,6-Dinitro-o-cresol	50	1600
5-Nitro-o-toluidine	10	330
7,12-Dimethylbenz[a]anthracene	10	330
Acenaphthene	10	330
Acenaphthylene	10	330
Acetophenone	10	330
alpha, alpha-Dimethylphenethylamine	10	330
Aniline	10	330
Anthracene	10	330
Aramite	20	660
Benzo[a]anthracene	10	330
Benzo[a]pyrene	10	330
Benzo[b]fluoranthene	10	330
Benzo[ghi]perylene	10	330
Benzo[k]fluoranthene	10	330
Benzyl alcohol	20	660
Bis(2-chloroethoxy)methane	10	330
Bis(2-chloroethyl)ether	10	330
Bis(2-chloro-1-methylethyl) ether	10	330
Bis(2-ethylhexyl) phthalate	10	330
Butyl benzyl phthalate	10	330
Chrysene	10	330
Di-n-octyl phthalate	10	330
Di-n-butyl phthalate	10	330
Dibenzofuran	10	330
Dibenz[a,h]anthracene	10	330
Diethyl phthalate	10	330
Dimethyl phthalate	10	330
Diphenylamine	10	330

Table B-2, Continued
Page 4 of 9

Appendix VIII Semivolatile Organics (EPA Method CLP-SV, EPA Method 8270)

<u>Compound</u>	<u>Detection Limit Goals</u>	
	<u>Water, $\mu\text{g/L}$</u>	<u>Soil, $\mu\text{g/Kg}$</u>
Ethyl methanesulfonate	10	330
Fluoranthene	10	330
Fluorene	10	330
Hexachlorobenzene	10	330
Hexachlorobutadiene	10	330
Hexachlorocyclopentadiene	10	330
Hexachloroethane	10	330
Hexachlorophene	10	330
Indeno(1,2,3-cd)pyrene	10	330
Isophorone	10	330
Isosafrole	10	330
m-Cresol	10	330
m-Nitroaniline	50	1600
m-Dinitrobenzene	10	330
Methapyrilene	10	330
Methyl methansulfonate	10	330
N-Nitrosodimethylamine	10	330
N-Nitrosodi-n-butylamine	10	330
N-Nitrosomorpholine	10	330
N-Nitrosopiperidine	10	330
N-Nitrosopyrrolidine	10	330
N-Nitrosodipropylamine	10	330
N-Nitrosomethylethylamine	10	330
N-Nitrosodiethylamine	10	330
N-Nitrosodiphenylamine	10	330
Naphthalene	10	330
Nitrobenzene	10	330
o-Nitroaniline	50	1600
o-Toluidine	10	330
o-Nitrophenol	10	330
o-Cresol	10	330
O,O,O-Triethyl phosphorothioate	10	330
p-Nitrophenol	10	330
p-Nitroaniline	50	1600
p-Chloroaniline	10	330
p-Chloro-m-cresol	10	330
p-Cresol	10	330
p-(Dimethylamino)azobenzene	10	330

Table B-2, Continued
Page 5 of 9

Appendix VIII Semivolatile Organics (EPA Method CLP-SV, EPA Method 8270)

<u>Compound</u>	Detection Limit Goals	
	<u>Water, $\mu\text{g/L}$</u>	<u>Soil, $\mu\text{g/Kg}$</u>
p-Phenylenediamine	10	330
Pentachlorobenzene	10	330
Pentachloroethane	10	330
Pentachloronitrobenzene	50	1600
Pentachlorophenol	50	1600
Phenacetin	10	330
Phenanthrene	10	330
Phenol	10	330
Phorate	10	330
Pronamide	10	330
Pyridine	20	660
Pyrene	10	330
Safrole	10	330
sym-Trinitrobenzene	10	330

Appendix VIII Organophosphorus Pesticides (EPA Method 8140)

<u>Compound</u>	Detection Limit Goals	
	<u>Water, $\mu\text{g/L}$</u>	<u>Soil, $\mu\text{g/Kg}$</u>
Dimethoate	10	330
Disulfoton	10	330
Famphur	10	330
Methyl parathion	10	330
Parathion	10	330
Phorate	10	330
Pronamide	10	330
Tetraethyl dithiopyrophosphate	10	330

Appendix VIII Herbicides (EPA Method 8150)

<u>Compound</u>	Detection Limit Goals	
	<u>Water, $\mu\text{g/L}$</u>	<u>Soil, $\mu\text{g/Kg}$</u>
2,4-D; 2,4-Dichlorophenoxy acetic acid	10	330
Silvex; 2,4,5-TP	2	200
2,4,5-T; 2,4,5-Trichlorophenoxyacetic acid	2	200

Table B-2, Continued
Page 6 of 9

Appendix VIII Alcohols and Other
(EPA Method 8240 or 8015)

<u>Compound</u>	<u>Detection Limit Goals</u>	
	<u>Water, $\mu\text{g/L}$</u>	<u>Soil, $\mu\text{g/Kg}$</u>
Acetonitrile; methyl cyanide	100	10000
1,4-Dioxane	100	10000
Isobutyl alcohol	50	5000

Appendix VIII Pesticides/PCBs (SW846, EPA Method 8080; EPA, 1986)

<u>Compound</u>	<u>Detection Limit Goals</u>	
	<u>Water, $\mu\text{g/L}$</u>	<u>Soil, $\mu\text{g/Kg}$</u>
4,4'-DDT	0.1	16
4,4'-DDE	0.1	16
4,4'-DDD	0.1	16
Aldrin	0.05	8
alpha-BHC	0.05	8
beta-BHC	0.05	8
Chlordane	0.5	80
Chloroprene	10	330
Chlorobenzilate	10	330
delta-BHC	0.05	8
Diallate	10	330
Dieldrin	0.1	16
Endosulfan I	0.05	8
Endosulfan sulfate	0.1	16
Endosulfan II	0.1	16
Endrin aldehyde	0.1	16
Endrin	0.1	16
gamma-BHC; Lindane	0.05	8
Heptachlor	0.05	8
Isodrin	10	330
Kepone	10	330
Heptachlor epoxide	0.05	8
Methoxychlor	0.5	80
PCB 1016	0.5	80
PCB 1242	0.5	80
PCB 1232	0.5	80
PCB 1221	0.5	80
PCB 1248	0.5	80
PCB 1260	1	160
PCB 1254	1	160
Toxaphene	1	160

Table B-2, Continued
Page 7 of 9

Appendix VIII Inorganics/CLP Target Analytes

<u>Compound</u>	<u>EPA Method (SW846)</u>	<u>Detection Limit Goals</u>	
		<u>Water, mg/L</u>	<u>Soil, mg/Kg</u>
Cyanide	9010	0.04	250
Sulfide	9030	10	500
Aluminum	6010	0.2	40
Antimony	6010	0.06	12.0
Arsenic	7060	0.01	2.0
Barium	6010	0.2	40.0
Beryllium	6010	0.005	1.0
Cadmium	6010	0.005	1.0
Calcium	6010	5.0	1000
Chromium	6010	0.01	2
Cobalt	6010	0.05	10
Copper	6010	0.025	5.0
Iron	6010	0.05	10.0
Lead	7421	0.005	1.0
Magnesium	6010	5.0	1000
Manganese	6010	0.015	3.0
Mercury	7470	0.0002	0.04
Nickel	6010	0.04	8.0
Potassium	6010	5.0	1000
Selenium	7740	0.005	1.0
Silver	6010	0.01	2.0
Sodium	6010	5.0	1000
Thallium	7841	0.01	2.0
Vanadium	6010	0.08	16.0
Zinc	6010	0.02	4

Table B-2, Continued
Page 8 of 9

Miscellaneous Inorganic Analyses

<u>Parameter</u>	<u>Method</u>	<u>Water, mg/L</u>	<u>Detection Limit Goals</u>	
			<u>Soil, mg/Kg</u>	
Acid Digestion Procedure	SW846, 3050	NA	NA	
Arsenic	SW846, 7060	0.01	2.0	
Barium	SW846, 6010	0.2	40	
Cadmium	SW846, 6010	0.005	1.0	
Chromium	SW846, 6010	0.01	1.0	
Lead	SW846, 7421	0.005	1.0	
Mercury	SW846, 7470	0.0002	0.04	
Selenium	SW846, 7740	0.005	1.0	
Silver	SW846, 6010	0.01	2.0	
pH	SW846, 9040, 9045	-	-	
Chloride	EPA 300.00	0.015	0.15	
Sulfate	EPA 300.0	0.200	2.00	
Nitrate/nitrite	EPA 300.0	0.01	0.10	
Fluoride	EPA 300.0	0.01	0.10	

Table B-2, Continued
Page 9 of 9

Appendix VIII Dioxins/Furans (SW846, EPA Method 8280)

<u>Compound (Total)</u>	<u>Detection Limit Goals</u>	
	<u>Water, $\mu\text{g/L}$</u>	<u>Soil, $\mu\text{g/Kg}$</u>
Tetrachlorodibenzodioxin (TCDD)	0.01	0.5
Pentachlorodibenzodioxin (PeCDD)	0.01	0.5
Hexachlorodibenzodioxin (HxCDD)	0.01	0.5
Heptachlorodibenzodioxin (HpCDD)	0.01	0.5
Octachlorodibenzodioxin (OCDD)	0.01	0.5
Tetrachlorodibenzofuran (TCDF)	0.01	0.5
Pentachlorodibenzofuran (PeCDF)	0.01	0.5
Hexachlorodibenzofuran (HxCDF)	0.01	0.5
Heptachlorodibenzofuran (HpCDF)	0.01	0.5
Octachlorodibenzofuran (OCDF)	0.01	0.5

APPENDIX C

INORGANIC ANALYSIS AND CHEMISTRY ANALYSIS RESULTS

TABLE C-1

EXPLANATION OF INORGANIC RESULTS QUALIFIERS

- B - Indicates the reported value and less than the contract required quantitation limit but greater than or equal to the instrument detection limit.
- U - Indicates the analyte was analyzed for but not detected at the value reported.
- E - Indicates the reported value is estimated because of the presence of an interference.
- M - Indicates the duplicate injection precision was not met.
- N - Indicates the spiked sample recovery was not within the control limit.
- S - Indicates the reported value was determined by the method of standard additions.
- W - The post digestion spike for the furnace AA analysis was out of control limits while the sample absorbance was less than 50% of the spike absorbance.
- * - The duplicate analysis was not within control limit.
- + - The correlation coefficient for the MSA was less than 0.995.
- P - The analyte was determined by ICP analysis.
- A - The analyte was determined by Flame AA.
- F - The analyte was determined by Furnace AA.
- CV - The analyte was determined by Cold Vapor AA.
- NR - The analyte is not required to be analyzed.

1
INORGANIC ANALYSIS DATA SHEET

CPP115

Lab Name: PACIFIC NW ENV LABORATORY

Contract:

Lab Code: FNEL

Case No.:

SAS No.:

SDG No.: FN3021

Matrix (soil/water): SOIL

Lab Sample ID: 3021-01

Level (low/med): LOW

Date Received: 03/28/91

% Solids: 93.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic	5.7	S		F
7440-39-3	Barium	55.9			P
7440-41-7	Beryllium				NR
7440-43-9	Cadmium	1.1	U		P
7440-70-2	Calcium				NR
7440-47-3	Chromium	20.4			F
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	8.7			F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.09	U,N		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium	0.63	U		F
7440-22-4	Silver	2.2	U		P
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: COARSE

Color After: YELLOW

Clarity After:

Artifacts: YES

Comments:

BECAUSE OF SOFTWARE LIMITATIONS, THE CLIENT'S SAMPLE ID COULD NOT BE ENTERED AT THE TOP OF THIS PAGE. THE CORRESPONDING CLIENT SAMPLE ID IS CPP48-1-15.

THE ARTIFACTS CONSISTED OF ROCKS.

200200

1
INORGANIC ANALYSIS DATA SHEET

CPF120

Lab Name: PACIFIC NW ENV LABORATORY

Contract:

Lab Code: PNEL

Case No.:

SAS No.:

SDG No.: FN3021

Matrix (soil/water): SOIL

Lab Sample ID: 3021-02

Level (low/med): LOW

Date Received: 03/29/91

% Solids: 91.7

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic	6.8			F
7440-39-3	Barium	114			F
7440-41-7	Beryllium				NR
7440-43-9	Cadmium	1.1	U		F
7440-70-2	Calcium				NR
7440-47-3	Chromium	13.6			F
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	7.7			F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.10	U	N	CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium	0.65	U		F
7440-22-4	Silver	2.2	U		F
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: FINE

Color After: YELLOW

Clarity After:

Artifacts: NO

Comments:

BECAUSE OF SOFTWARE LIMITATIONS, THE CLIENT'S SAMPLE ID COULD NOT BE ENTERED AT THE TOP OF THIS PAGE. THE CORRESPONDING CLIENT SAMPLE ID IS CPF48-1-20.

002003

1
INORGANIC ANALYSIS DATA SHEET

CPP125

Lab Name: PACIFIC NW ENV LABORATORY

Contract:

Lab Code: PNEL

Case No.:

SAS No.:

SDG No.: FN3021

Matrix (soil/water): SOIL

Lab Sample ID: 3021-03

Level (low/med): LOW

Date Received: 03/28/91

% Solids: 94.6

Concentration Units (ug/L or g/g dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-38-0	Antimony				NR
7440-38-2	Arsenic	5.7			F
7440-39-3	Barium	74.0			P
7440-41-7	Beryllium				NR
7440-43-3	Cadmium	1.0	U		F
7440-70-2	Calcium				NR
7440-47-3	Chromium	18.4			P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	6.5			F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.10	U	N	CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium			U;W	F
7440-22-4	Silver			U	P
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: COARSE

Color After: YELLOW

Clarity After:

Artifacts: YES

Comments:

BECAUSE OF SOFTWARE LIMITATIONS, THE CLIENT'S SAMPLE ID COULD NOT BE ENTERED AT THE TOP OF THIS PAGE. THE CORRESPONDING CLIENT SAMPLE ID IS CPP48-1-25.

THE ARTIFACTS CONSISTED OF ROCKS.

1
INORGANIC ANALYSIS DATA SHEET

CPF130

Lab Name: PACIFIC NW ENV LABORATORY

Contract:

Lab Code: PNEL

Case No.:

SAS No.:

SDG No.: PN3021

Matrix (soil/water): SOIL

Lab Sample ID: 3021-04

Level (low/med): LOW

Date Received: 03/28/91

% Solids: 92.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic	6.5			F
7440-39-3	Barium	99.8			P
7440-41-7	Beryllium				NR
7440-43-9	Cadmium	1.0	U		P
7440-70-2	Calcium				NR
7440-47-3	Chromium	16.3			P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	10.0			F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.09	U	N	CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium	0.61	U	W	F
7440-22-4	Silver	2.1	U		P
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: COARSE

Color After: YELLOW

Clarity After:

Artifacts: YES

Comments:

BECAUSE OF SOFTWARE LIMITATIONS, THE CLIENT'S SAMPLE ID COULD NOT BE ENTERED AT THE TOP OF THIS PAGE. THE CORRESPONDING CLIENT SAMPLE ID IS CPF48-1-30.

THE ARTIFACTS CONSISTED OF ROCKS.

1
INORGANIC ANALYSIS DATA SHEET

CPP135

Lab Name: PACIFIC NW ENV LABORATORY

Contract:

Lab Code: FNEL

Case No.:

SAS No.:

SDG No.: PN3021

Matrix (soil/water): SOIL

Lab Sample ID: 3021-05

Level (low/med): LOW

Date Received: 03/28/91

% Solids: 93.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic	4.4	S		F
7440-39-3	Barium	88.5			P
7440-41-7	Beryllium				NR
7440-43-9	Cadmium	1.1	U		P
7440-70-2	Calcium				NR
7440-47-3	Chromium	13.3			P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	4.6			F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.08	U	N	CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium	0.63	U	W	F
7440-22-4	Silver	2.1	U		F
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: COARSE

Color After: YELLOW

Clarity After:

Artifacts: YES

Comments:

BECAUSE OF SOFTWARE LIMITATIONS, THE CLIENT'S SAMPLE ID COULD NOT BE ENTERED AT THE TOP OF THIS PAGE. THE CORRESPONDING CLIENT SAMPLE ID IS CPP48-1-35.

THE ARTIFACTS CONSISTED OF ROCKS.

1
INORGANIC ANALYSIS DATA SHEET

CPP140

Lab Name: PACIFIC NW ENV LABORATORY

Contract:

Lab Code: PNEL

Case No.:

SAS No.:

SDG No.: PN3021

Matrix (soil/water): SOIL

Lab Sample ID: 3021-07

Level (low/med): LOW

Date Received: 03/28/91

% Solids: 94.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic	4.6		S	F
7440-39-3	Barium	111			F
7440-41-7	Beryllium				NR
7440-43-9	Cadmium	1.0	U		F
7440-70-2	Calcium				NR
7440-47-3	Chromium	20.8			F
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	8.4			F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.09	U	N	CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium	0.62	U	W	F
7440-22-4	Silver	2.0	U		F
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: FINE
COARSE
4/5/91 JMW

Color After: YELLOW

Clarity After:

Artifacts: YES

Comments:

BECAUSE OF SOFTWARE LIMITATIONS, THE CLIENT'S SAMPLE ID COULD NOT BE ENTERED AT THE TOP OF THIS PAGE. THE CORRESPONDING CLIENT SAMPLE ID IS CPP48-1-40.

THE ARTIFACTS CONSISTED OF ROCKS.

1
INORGANIC ANALYSIS DATA SHEET

CFP145

Lab Name: PACIFIC NW ENV LABORATORY

Contract:

Lab Code: PNEL

Case No.:

SAS No.:

SDG No.: FN3021

Matrix (soil/water): SOIL

Lab Sample ID: 3021-08

Level (low/med): LOW

Date Received: 03/28/91

% Solids: 82.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic	13.2	S		F
7440-39-3	Barium	314			F
7440-41-7	Beryllium				NR
7440-43-9	Cadmium	1.2	U		F
7440-70-2	Calcium				NR
7440-47-3	Chromium	33.6			F
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	23.9			F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.12	U	N	CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium	0.72	U	W	F
7440-22-4	Silver	2.4	U		F
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: YELLOW

Clarity After:

Artifacts: NO

Comments:

BECAUSE OF SOFTWARE LIMITATIONS, THE CLIENT'S SAMPLE ID COULD NOT BE ENTERED AT THE TOP OF THIS PAGE. THE CORRESPONDING CLIENT SAMPLE ID IS CFP48-1-45.

1
INORGANIC ANALYSIS DATA SHEET

CPF35E

Lab Name: PACIFIC NW ENV LABORATORY

Contract:

Lab Code: PNEL

Case No.:

SAS No.:

SDG No.: PN3021

Matrix (soil/water): WATER

Lab Sample ID: 3021-06

Level (low/med): LOW

Date Received: 03/28/91

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic	2.0	U		F
7440-39-3	Barium	15.0	U		F
7440-41-7	Beryllium				NR
7440-43-9	Cadmium	5.0	U		F
7440-70-2	Calcium				NR
7440-47-3	Chromium	10.0	U		F
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	3.0	U		F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium	3.0	U		F
7440-22-4	Silver	10.0	U		F
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

BECAUSE OF SOFTWARE LIMITATIONS, THE CLIENT'S SAMPLE ID COULD NOT BE ENTERED AT THE TOP OF THIS PAGE. THE CORRESPONDING CLIENT SAMPLE ID IS CPF48-1-35-EB.

INORGANIC ANALYSIS REPORT

Client Sample ID	CPP48-1-15	CPP48-1-20	CPP48-1-25	CPP48-1-30
PNEL Sample ID	3021-01	3021-02	3021-03	3021-04
Sample Matrix	Soil	Soil	Soil	Soil
Date Sample Received	03-28-91	03-28-91	03-28-91	03-28-91
Date Sample Analyzed	03-28-91	03-28-91	03-29-91	03-29-91
Units of Measure	mg/kg	mg/kg	mg/kg	mg/kg

Compound

Soluble Nitrite (NO ₂ -N)	0.578	0.506 U	0.487 U	0.514 U
Soluble Nitrate (NO ₃ -N)	4.68	5.71	0.974	0.705

Client Sample ID	CPP48-1-15	CPP48-1-20	CPP48-1-25	CPP48-1-30
PNEL Sample ID	3021-01	3021-02	3021-03	3021-04
Sample Matrix	Soil	Soil	Soil	Soil
Date Sample Received	03-28-91	03-28-91	03-28-91	03-28-91
Date Sample Analyzed	03-28-91	03-28-91	03-28-91	03-28-91

Compound

Soil pH measured in water	—	—	8.07	8.15
Soil pH measured in 0.01M CaCl ₂	6.72	6.83	—	—

003001

INORGANIC ANALYSIS REPORT

Client Sample ID	CPP48-1-35	CPP48-1-35-EB	CPP48-1-40	CPP48-1-45
PNELI Sample ID	3021-05	3021-06	3021-07	3021-08
Sample Matrix	Soil	Water	Soil	Soil
Date Sample Received	03-28-91	03-28-91	03-28-91	03-28-91
Date Sample Analyzed	03-29-91	03-28-91	03-29-91	03-29-91
Units of Measure	mg/kg	mg/l	mg/kg	mg/kg

Compound

Soluble Nitrite (NO ₂ -N)	0.590	—	0.529	0.590
Soluble Nitrate (NO ₃ -N)	0.522 U	—	0.529 U	0.837
Nitrite (NO ₂ -N)	—	0.100 U	—	—
Nitrate (NO ₃ -N)	—	0.100 U	—	—

Client Sample ID	CPP48-1-35	CPP48-1-35-EB	CPP48-1-40	CPP48-1-45
PNELI Sample ID	3021-05	3021-06	3021-07	3021-08
Sample Matrix	Soil	Water	Soil	Soil
Date Sample Received	03-28-91	03-28-91	03-28-91	03-28-91
Date Sample Analyzed	03-28-91	03-28-91	03-28-91	03-28-91

Compound

pH	—	5.33	—	—
Soil pH measured in water	8.26	—	—	—
Soil pH measured in 0.01M CaCl ₂	—	—	6.86	6.95

003002

INORGANIC ANALYSIS REPORT

Client Sample ID	Method Blank	Method Blank
PNEL Sample ID	3021-MB	3021-MB
Sample Matrix	Soil	Water
Date Sample Received	NA	NA
Date Sample Analyzed	03-28-91	03-28-91
Units of Measure	mg/kg	mg/l

Compound

Soluble Nitrite ($\text{NO}_2\text{-N}$)	0.500 U	—
Soluble Nitrate ($\text{NO}_3\text{-N}$)	0.500 U	—
Nitrite ($\text{NO}_2\text{-N}$)	—	0.100 U
Nitrate ($\text{NO}_3\text{-N}$)	—	0.100 U

003003

INORGANIC DATA ASSESSMENT SUMMARY

PROJECT NO. 893-1195.530 SITE INEL
 LABORATORY PNE LT SAMPLES/MATRIX 7 bottles
1 water (EB)
 SDG # CPP48-1-15

DATA ASSESSMENT SUMMARY

	ICP	AA	HG	CYANIDE
1. HOLDING TIMES	<u>0</u>	<u>0</u>	<u>0</u>	
2. CALIBRATIONS	<u>0</u>	<u>0</u>	<u>0</u>	
3. BLANKS	<u>0</u>	<u>0</u>	<u>0</u>	
4. ICS	<u>0</u>			
5. LCS	<u>0</u>	<u>0</u>	<u>0</u>	
6. DUPLICATE ANALYSIS	<u>0</u>	<u>0</u>	<u>0</u>	
7. MATRIX SPIKE	<u>0</u>	<u>0</u>	<u>0</u>	
8. MSA		<u>0</u>		
9. SERIAL DILUTION	<u>0</u>			
10. SAMPLE VERIFICATION	<u>0</u>	<u>0</u>	<u>0</u>	
11. OTHER QC	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	
12. OVERALL ASSESSMENT	<u>0</u>	<u>0</u>	<u>0</u>	

0 = Data had no problems/or qualified due to minor problems.
 M = Data qualified due to major problems.
 Z = Data unacceptable.
 X = Problems, but do not affect data.

NOTES: Data as qualified acceptable for
use.

Validated by: Dennis L. Plummer Date: 5/1/91
 Reviewed by: _____ Date: _____

Acceptable
YES NO

1. Holding Times ----- ☒ -----

Samples collected 3/26 + 3/27/91

Hg Anal 4/2/91 / GFAA - As 4/1, Pb 4/2, Se 4/3

ICP Anal - 4/1/91

2. Calibrations ----- ☒ -----

Initial
ICP-OK ☒

ICV
ICP-OK ☒

CCVs
ICP-OK ☒

only using 3-Stds

GFAA-OK ☒

GFAA-OK ☒

GFAA-OK ☒

instead of 4 for Hg

only 3 Stds
used
Hg-CV-OK ☒

Hg-CV-OK ☒

Hg-CV-OK ☒

Calibration!

Tell
LAB.

3. Blanks ----- ☒ -----

No Analytes Detected in any blank, including
Field Blank.

No Qualification Required!

4. ICP Interference Check Sample (ICS) ----- ☒ -----

ICS anal frequency requirement met.

ICS %R for all analytes within 80-120%
requirements. No Qualification Required!

5. Laboratory Control Sample (LCS) ----- ☒ -----

LCS analysis performed as required. All
recoveries within respective control
limits. No Qualification Required!

6. Duplicate Sample Analysis ----- ☒ -----

Recalc. As, Cr - All RPDs within appropriate
control limits.

No Qualification Required

7. Matrix Spike Sample Analysis ----- ☒ -----

Recalc As, Cr & Hg - %R All %Rs within
75-125% except Hg - 126.8% Quality

all soil Hg results > IDL as "J"!

Lab did not run Post-Digest Spike on Mercury!

all
r 70.995

SDG # CPP48-1-15 Project No. 843-1195.530

Acceptable
YES NO

8. Furnace Atomic Absorption QC ----- ☒ ☐

Pb - Anal spike = 20 instead 6.0

Se - CV = 20 Stds = 0, 5, 15, 30 / Anal Spike < 85% for 30, 35, 40, + 45

All other GFAA QC OK ☒ Quality 30, 35, 40 + 45 "US"!

9. ICP Serial Dilution ----- ☒ ☐

Sample contained no analytes $\geq 50 \times$ IDL

No Qualification Required!

10. Sample Result Verification ----- ☒ ☐

Recalculated sample results for As, Cr &
Ag for sample CPP48-1-15. No errors,
calc. or Trans., noted.

11. Field Duplicates ----- N/A

N

12. Overall Assessment ----- ☒ ☐

Data as qualified, acceptable for
use.

INORGANIC DATA ASSESSMENT SUMMARY

PROJECT NO. 893-1195 SITE INEL
 LABORATORY PNELT SAMPLES/MATRIX 7 soils
1 Water (EB)
 SDG # CPP48-01

DATA ASSESSMENT SUMMARY

	ICP	AA	PH NO	NO₂/NO₃ CYANIDE
1. HOLDING TIMES			0	0
2. CALIBRATIONS			0	0
3. BLANKS			N/A	0
4. ICS				
5. ICS I.C. Ret. Times			N/A	0
6. DUPLICATE ANALYSIS			0	0
7. MATRIX SPIKE			N/A	0
8. MSA				
9. SERIAL DILUTION				
10. SAMPLE VERIFICATION			0	0
11. OTHER QC			N/A	N/A
12. OVERALL ASSESSMENT			0	0

0 = Data had no problems/or qualified due to minor problems.
 M = Data qualified due to major problems.
 Z = Data unacceptable.
 X = Problems, but do not affect data.

NOTES: _____

Validated by: Dennis R. Phinney Date: 5/1/91
 Reviewed by: _____ Date: _____

Acceptable
YES NO1. Holding Times ----- ☒Samples Collected 3/26 + 3/27 -Samples analyzed ^{NO₂+NO₃} 3/28 + 3/29 pH 3/28No established HT for soil samples. Samples Rec'd 3/282. Calibrations ----- ☒NO₂ - ^{Initial r² > .995} BIK + 5 Stds - No ICV anal. - CCVs all 90-110%NO₃ - ^{r² > .995} BIK + 5 Stds - ICV - 90-110% - CCVs all 90-110%pH - 3 Stds (4.0, 7.0, 10.0) - ICVs: 90-110% - CCVs: 90-110%3. Blanks ----- ☒pH: N/A NO₂/NO₃ - No detects in Prep or
Method BlanksField - No contaminants detected in equip. Blank.

4. ICP Interference Check Sample (ICS) -----

N/A5. ^{Ion Chromat. RT.} Laboratory Control Sample (LCS) ----- ☒All retention times within ± 0.1 min NO₂
and ± 0.25 min NO₃6. Duplicate Sample Analysis ----- ☒Duplicates run for all analyses & all matrices
% RPDs all within $\pm 20\%$ No qualification required.7. Matrix Spike Sample Analysis ----- ☒pH: N/A, Mat. Spk. run on both matrix
all spike recoveries within 75-125%
No qualification necessary

Acceptable
YES NO

8. Furnace Atomic Absorption QC -----

N/A

9. ICP Serial Dilution -----

N/A

10. Sample Result Verification ----- ✓

No calculation or transcription errors.

11. Field Duplicates -----

N/A

12. Overall Assessment ----- ✓

Data as reported by the
laboratory is acceptable for use
No quantification necessary.

APPENDIX D
VOLATILE ORGANIC ANALYSIS RESULTS

TARGET RADIONUCLIDES
LAND DISPOSAL UNIT CPP-48

<u>Radionuclides</u>	<u>Methods</u>
Americium 241	EERF Am-01 ¹
Antimony 125	EPA 901.1 ²
Cerium 144	EPA 901.1 ²
Cesium 134, 137	EPA 901.1 ²
Cobalt 60, 58	EPA 901.1 ²
Iodine 129	EPA 901.1 ²
Neptunium	EML Np-01 ³
Plutonium 238, 239, 240	EERF Pu-01 ¹
Ruthenium 103, 106	EPA 901.1 ²
Strontium 90	EML Sr-05 ³
Uranium 234, 235, 238	EERF 00-07 ¹

¹Eastern Environmental Radiation Facility, Radiochemistry Procedures Manual,
EPA 520/5-84-006, (EPA, 1984a)

²Prescribed Procedures for the Measurement of Radioactivity in Drinking
Water, EPA 600/4-80-032, (EPA, 1982)

³EML Procedures Manual, 25th Edition, (DOE, 1982)

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Colder Associates, Inc.
4104-148th Avenue, NE
Redmond, WA 98052

Attn: Kent Angelos

Work ID: Soil
P O # :

Date Received: 03/28/91
Date Reported:
Work Order: 91-03-578
Category: CUSTODY_CLP

Test		CPP48-1-10	CPP48-1-15	CPP48-1-20	CPP48-1-25
	Units				
		03/26/91 11:30	03/26/91 12:50	03/26/91 13:30	03/26/91 14:10
Americium-241		no data	no data	no data	no data
	pCi/gram				
Cerium-144		<0.05	<0.05	<0.05	<0.05
	pCi/gram				
Cobalt-58		<0.09	<0.09	<0.09	<0.09
	pCi/gram				
Cobalt-60		<0.07	<0.07	<0.07	<0.07
	pCi/gram				
Cesium-134		<0.08	<0.08	<0.08	<0.08
	pCi/gram				
Cesium-137		<0.06	3.3+/-0.1	<0.2	<0.1
	pCi/gram				
Iodine-129		<0.05	<0.05	<0.5	<0.04
	pCi/gram				
Neptunium-237		<0.1	<0.1	<0.1	<0.05
	pCi/gram				

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Test	Units	CPP48-1-10	CPP48-1-15	CPP48-1-20	CPP48-1-25
		03/26/91 11:30	03/26/91 12:50	03/26/91 13:30	03/26/91 14:10
Plutonium-239/240		no data	no data	no data	no data
	pCi/gram				
Plutonium-238		no data	no data	no data	no data
	pCi/gram				
Percent solids		96.1	95.5	93.3	94.4
	%				
Ruthenium-103		<0.2	<0.2	<0.2	<0.2
	pCi/gram				
Ruthenium-106		<0.07	<0.07	<0.07	<0.07
	pCi/gram				
Antimony-125		<0.03	<0.03	<0.03	<0.03
	pCi/gram				
Uranium-234		no data	no data	no data	no data
	pCi/gram				
Uranium-235		no data	no data	no data	no data
	pCi/gram				
Uranium-238		no data	no data	no data	no data
	pCi/gram				



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Work Order # 91-03-578

Test
Units
CPP48-1-30
CPP48-1-35
CPP-48-1-35-EB
CPP48-1-40
03/26/91 14:50
03/27/91 11:40
03/27/91 13:30
03/27/91 14:30

Americium-241	pci/liter	no data	no data	no data
Americium-241	pci/gram	no data	no data	no data
Cerium-144	pci/gram	no data	no data	no data
Cerium-144	pci/liter	<0.05	<0.05	<0.05
Cobalt-58	pci/gram	<0.05	<0.05	<0.05
Cobalt-58	pci/liter	<0.09	<0.09	<0.09
Cobalt-60	pci/gram	<0.07	<0.07	<0.07
Cobalt-60	pci/liter	<0.08	<0.08	<0.08
Cesium-134	pci/gram	<0.08	<0.08	<0.08
Cesium-134	pci/liter	<0.08	<0.08	<0.08
Cesium-137	pci/gram	<0.08	<0.08	<0.08
Cesium-137	pci/liter	<0.08	<0.08	<0.08

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Continued From Above

Test	Units	CPP48-1-30 03/26/91 14:50	CPP48-1-35 03/27/91 11:40	CPP-48-1-35-EB 03/27/91 13:30	CPP48-1-40 03/27/91 14:30
Cesium-137		<0.09	<0.07		<0.06
	pCi/gram				
Iodine-129				<5	
	pCi/liter				
Iodine-129		<0.05	<0.05		<0.05
	pCi/gram				
Neptunium-237				<5	
	pCi/liter				
Neptunium-237		<0.05	<0.05		<0.05
	pCi/gram				
Plutonium-239/240				no data	
	pCi/liter				
Plutonium-239/240		no data	no data		no data
	pCi/gram				
Plutonium-238				no data	
	pCi/liter				
Plutonium-238		no data	no data		no data
	pCi/gram				
Percent solids		91.2	95.4		94.2
	%				

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Continued From Above

Test	Units	CPP48-1-30 03/26/91 14:50	CPP48-1-35 03/27/91 11:40	CPP-48-1-35-EB 03/27/91 13:30	CPP48-1-40 03/27/91 14:30
Ruthenium-103				<15	
Ruthenium-103	pCi/liter				
Ruthenium-103	pCi/gram	<0.2	<0.2		<0.2
Ruthenium-106				<21	
Ruthenium-106	pCi/liter				
Ruthenium-106	pCi/gram	<0.07	<0.07		<0.07
Antimony-125				<10	
Antimony-125	pCi/liter				
Antimony-125	pCi/gram	<0.03	<0.03		<0.03
Strontium-90				<0.5	
Strontium-90	pCi/liter				
Uranium-234	pCi/liter			no data	
Uranium-234	pCi/gram	no data	no data		no data
Uranium-235				no data	
Uranium-235	pCi/liter				



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REPORT

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Test	Units	CPP48-1-30	CPP48-1-35	CPP-48-1-35-EB	CPP48-1-40
		03/26/91 14:50	03/27/91 11:40	03/27/91 13:30	03/27/91 14:30
Uranium-235		no data	no data		no data
	pCi/gram				
Uranium-238				no data	
	pCi/liter				
Uranium-238		no data	no data		no data
	pCi/gram				

Test	Units	CPP48-1-45
		03/27/91 15:10
Americium-241		no data
	pCi/gram	
Cerium-144		no data
	pCi/gram	
Cobalt-58		no data
	pCi/gram	
Cobalt-60		no data
	pCi/gram	



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Test	Units	CPP48-1-45
		03/27/91 15:10
Cesium-134		no data
	pCi/gram	
Cesium-137		no data
	pCi/gram	
Iodine-129		no data
	pCi/gram	
Neptunium-237		no data
	pCi/gram	
- Plutonium-239/240		no data
	pCi/gram	
Plutonium-238		no data
	pCi/gram	
Percent solids		82.4
	%	
Ruthenium-103		no data
	pCi/gram	
Ruthenium-106		no data
	pCi/gram	
Antimony-125		no data
	pCi/gram	
Uranium-234		no data
	pCi/gram	



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Test	Units	CPP48-1-45
Uranium-235	pCi/gram	03/27/91 15:10 no data
Uranium-238	pCi/gram	no data

Approved By: 



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CEP, Inc. REPORT
Results by Sample

Work Order # 91-03-578

SAMPLE ID CPP48-1-10

FRACTION 01A TEST CODE SR90 5 NAME Strontium-90

Date & Time Collected 03/26/91 11:30:00 Category SOIL

Type of Analysis	Detection Limit pCi/gram	RESULT
Strontium-90	0.03	<u>0.18+/-0.09</u>

All results reported in:

UNITS pCi/gram

SAMPLE ID CPP48-1-15

FRACTION 02A TEST CODE SR90 5 NAME Strontium-90

Date & Time Collected 03/26/91 12:50:00 Category SOIL

Type of Analysis	Detection Limit pCi/gram	RESULT
Strontium-90	0.03	<u><0.03</u>

All results reported in:

UNITS pCi/gram



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CEP, Inc.

REPORT

Work Order # 91-03-578

Results by Sample

SAMPLE ID CPP48-1-20

FRACTION 03A TEST CODE SR90 5 NAME Strontium-90

Date & Time Collected 03/26/91 13:30:00 Category SOIL

Type of Analysis

Detection Limit
pCi/gram

RESULT

Strontium-90

0.03

0.12+/-0.09

All results reported in:

UNITS pCi/gram

SAMPLE ID CPP48-1-25

FRACTION 04A TEST CODE SR90 5 NAME Strontium-90

Date & Time Collected 03/26/91 14:10:00 Category SOIL

Type of Analysis

Detection Limit
pCi/gram

RESULT

Strontium-90

0.03

<0.03

All results reported in:

UNITS pCi/gram



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CEP, Inc. REPORT
Results by Sample

Work Order # 91-03-578

SAMPLE ID CPP48-1-30

FRACTION 05A TEST CODE SR90 5 NAME Strontium-90

Date & Time Collected 03/26/91 14:50:00 Category SOIL

Type of Analysis	Detection Limit pCi/gram	RESULT
Strontium-90	0.03	<u><0.03</u>

All results reported in:

UNITS pCi/gram

SAMPLE ID CPP48-1-35

FRACTION 06A TEST CODE SR90 5 NAME Strontium-90

Date & Time Collected 03/27/91 11:40:00 Category SOIL

Type of Analysis	Detection Limit pCi/gram	RESULT
Strontium-90	0.03	<u><0.03</u>

All results reported in:

UNITS pCi/gram



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CEP, Inc. REPORT
Results by Sample

Work Order # 91-03-578

SAMPLE ID CPP48-1-40

FRACTION 08A TEST CODE SR90 5 NAME Strontium-90
Date & Time Collected 03/27/91 14:30:00 Category SOIL

Type of Analysis	Detection Limit pCi/gram	RESULT
Strontium-90	0.03	<u><0.03</u>

All results reported in:

UNITS pCi/gram

SAMPLE ID CPP48-1-45

FRACTION 09A TEST CODE SR90 5 NAME Strontium-90
Date & Time Collected 03/27/91 15:10:00 Category SOIL

Type of Analysis	Detection Limit pCi/gram	RESULT
Strontium-90	0.03	<u>0.26+/-0.10</u>

All results reported in:

UNITS pCi/gram

TABLE D-1

EXPLANATION OF ORGANIC RESULTS QUALIFIERS

- U - Indicates the compound was analyzed for but not detected. The sample quantitation limit is the value listed and has been corrected for dilution and percent moisture. For soil samples subjected to GPC clean-up procedures, the sample quantitation limit is also multiplied by 2 to account for the fact that only half of the extract is recovered.
- J - Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicate the presence of a compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.
- C - This flag applies to pesticide results where the identification has been confirmed by GC/MS. Single component pesticides $\geq 10 \text{ ng}/\mu\text{l}$ in the final extract are to be confirmed by GC/MS.
- B - This flag is used when the analyte is found in the associated blank as well as the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.
- E - This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis. This flag does not apply to pesticide/PCBs analyzed by GC methods.
- D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.
- A - This flag indicates that a TIC is suspected to be an aldol-condensation product.
- X - This flag identifies a specific flag required to properly define the results. When used they must be fully described in the associated case narrative.

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CFP48-1-15

Lab Name: PNELI_____ Contract: INEL_____

Lab Code: PNELI__ Case No.: 3021__ SAS No.: _____ SDG No.: 3021__

Matrix: (soil/water) SOIL__ Lab Sample ID: 3021-01_____

Sample wt/vol: __5.0 (g/mL) G__ Lab File ID: B5908_____

Level: (low/med) LOW__ Date Received: 03/28/91

% Moisture: not dec. ___7 Date Analyzed: 03/29/91

Column: (pack/cap) CAP__ Dilution Factor: 1.0_____

		CONCENTRATION UNITS:	
CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	11	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

000001

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CPF48-1-15

Lab Name: PNELI_____ Contract: INEL_____

Lab Code: PNELI___ Case No.: 3021___ SAS No.: _____ SDG No.: 3021___

Matrix: (soil/water) SOIL___

Lab Sample ID: 3021-01_____

Sample wt/vol: ___5.0 (g/mL) G___

Lab File ID: B5908_____

Level: (low/med) LOW___

Date Received: 03/28/91

% Moisture: not dec. ___7

Date Analyzed: 03/29/91

Column (pack/cap) CAP___

Dilution Factor: 1.0_____

CONCENTRATION UNITS:

Number TICs found: 12

(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	Unknown alkane	15.85	70	J
2.	Unknown alkane	16.04	37	J
3.	Unknown alkane	16.19	220	J
4.	Unknown alkane	16.62	320	J
5.	Unknown alkane	16.74	270	J
6.	Unknown alkane	17.04	230	J
7.	Unknown alkane	17.30	87	J
8.	Unknown alkane	17.45	92	J
9.	Unknown alkane	17.92	67	J
10.	Unknown alkane	18.15	38	J
11.	Unknown alkane	18.62	30	J
12.	Unknown alkane	18.80	80	J

000002

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CPF48-1-15MS

Lab Name: PNELI_____ Contract: INEL_____

Lab Code: PNELI__ Case No.: 3021__ SAS No.: _____ SDG No.: 3021__

Matrix: (soil/water) SOIL__

Lab Sample ID: 3021-01MS_____

Sample wt/vol: __5.0 (g/mL) G__

Lab File ID: B5909_____

Level: (low/med) LOW__

Date Received: 03/28/91

% Moisture: not dec. ___7

Date Analyzed: 03/29/91

Column: (pack/cap) CAP__

Dilution Factor: 1.0_____

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	11	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

000003

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CPP48-1-15MSD

Lab Name: PNELI_____ Contract: INEL_____

Lab Code: PNELI__ Case No.: 3021__ SAS No.: _____ SDG No.: 3021__

Matrix: (soil/water) SOIL__ Lab Sample ID: 3021-01MSD__

Sample wt/vol: __5.0 (g/mL) G__ Lab File ID: B5910_____

Level: (low/med) LOW__ Date Received: 03/28/91

% Moisture: not dec. ___7 Date Analyzed: 03/29/91

Columns: (pack/cap) CAP__ Dilution Factor: 1.0_____

		CONCENTRATION UNITS:	
CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	11	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

000004

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CFP48-1-20

Lab Name: PNELI_____ Contract: INEL_____

Lab Code: PNELI___ Case No.: 3021___ SAS No.: _____ SDG No.: 3021___

Matrix: (soil/water) SOIL___ Lab Sample ID: 3021-02_____

Sample wt/vol: ___5.0 (g/mL) G___ Lab File ID: B5916_____

Level: (low/med) LOW___ Date Received: 03/28/91

% Moisture: not dec. ___8 Date Analyzed: 04/01/91

Column: (pack/cap) CAP___ Dilution Factor: 1.0_____

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	11	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

000005

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CPP48-1-20

Lab Name: PNELI_____ Contract: INEL_____

Lab Code: PNELI__ Case No.: 3021__ SAS No.: _____ SDG No.: 3021__

Matrix: (soil/water) SOIL__ Lab Sample ID: 3021-02_____

Sample wt/vol: __5.0 (g/mL) G__ Lab File ID: B5916_____

Level: (low/med) LOW__ Date Received: 03/28/91

% Moisture: not dec. __8 Date Analyzed: 04/01/91

Column (pack/cap) CAP__ Dilution Factor: 1.0_____

Number TICs found: __0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====

900000

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CFP48-1-25

Lab Name: PNEL1_____ Contract: INEL_____

Lab Code: PNEL1__ Case No.: 3021__ SAS No.: _____ SDG No.: 3021__

Matrix: (soil/water) SOIL__ Lab Sample ID: 3021-03_____

Sample wt/vol: __5.0 (g/mL) G__ Lab File ID: B5918_____

Level: (low/med) LOW__ Date Received: 03/28/91

% Moisture: not dec. __5 Date Analyzed: 04/01/91

Column: (pack/cap) CAP__ Dilution Factor: 1.0_____

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	11	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

000007

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CPP48-1-25

Lab Name: PNELI_____ Contract: INEL_____

Lab Code: PNELI__ Case No.: 3021__ SAS No.: _____ SDG No.: 3021__

Matrix: (soil/water) SOIL__

Lab Sample ID: 3021-03_____

Sample wt/vol: __5.0 (g/mL) G__

Lab File ID: B5918_____

Level: (low/med) LOW__

Date Received: 03/28/91

% Moisture: not dec. ___5

Date Analyzed: 04/01/91

Column (pack/cap) CAP__

Dilution Factor: 1.0_____

Number TICs found: __0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====
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000008

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CPF48-1-30

Lab Name: FNELI_____ Contract: INEL_____

Lab Code: FNELI__ Case No.: 3021__ SAS No.: _____ SDG No.: 3021__

Matrix: (soil/water) SOIL__ Lab Sample ID: 3021-04_____

Sample wt/vol: __5.0 (g/mL) G__ Lab File ID: B5919_____

Level: (low/med) LOW__ Date Received: 03/28/91

% Moisture: not dec. ___8 Date Analyzed: 04/01/91

Column: (pack/cap) CAP__ Dilution Factor: 1.0_____

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/Kg)	UG/KG
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	11	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	5	U
78-67-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

000009

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CPP48-1-30

Lab Name: PNELI_____ Contract: INEL_____

Lab Code: PNELI__ Case No.: 3021__ SAS No.: _____ SDG No.: 3021__

Matrix: (soil/water) SOIL__

Lab Sample ID: 3021-04_____

Sample wt/vol: __5.0 (g/mL) G__

Lab File ID: B5919_____

Level: (low/med) LOW__

Date Received: 03/28/91

% Moisture: not dec. __8

Date Analyzed: 04/01/91

Column (pack/cap) CAP__

Dilution Factor: 1.0_____

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: __0

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====
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000010

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CFP48-1-35

Lab Name: PNELI_____ Contract: INEL_____

Lab Code: PNELI___ Case No.: 3021___ SAS No.: _____ SDG No.: 3021___

Matrix: (soil/water) SOIL___ Lab Sample ID: 3021-05_____

Sample wt/vol: ___5.0 (g/mL) G___ Lab File ID: B5920_____

Level: (low/med) LOW___ Date Received: 03/28/91

% Moisture: not dec. ___7 Date Analyzed: 04/01/91

Column: (pack/cap) CAP___ Dilution Factor: 1.0_____

		CONCENTRATION UNITS:	
CAS NO.	COMPOUND	(ug/L or ug/Kg)	UG/KG
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	11	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

000011

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CPP48-1-35

Lab Name: FNELI_____ Contract: INEL_____

Lab Code: FNELI___ Case No.: 3021___ SAS No.: _____ SDG No.: 3021___

Matrix: (soil/water) SOIL___

Lab Sample ID: 3021-05_____

Sample wt/vol: ___5.0 (g/mL) G___

Lab File ID: B5920_____

Level: (low/med) LOW___

Date Received: 03/28/91

% Moisture: not dec. ___7

Date Analyzed: 04/01/91

Column (pack/cap) CAP___

Dilution Factor: 1.0_____

Number TICs found: __0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	G
=====	=====	=====	=====	=====
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000012

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CPP48-1-35-EB

Lab Name: PNELI Contract: INEL

Lab Code: PNELI Case No.: 3021 SAS No.: SDG No.: 3021

Matrix: (soil/water) WATER Lab Sample ID: 3021-06

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: A6817

Level: (low/med) LOW Date Received: 03/28/91

% Moisture: not dec. Date Analyzed: 03/29/91

Column: (pack/cap) CAP Dilution Factor: 1.0

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/L

Q

CAS NO.	COMPOUND	UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	46	
75-15-0	Carbon Disulfide	1	J
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	8	J
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

000013

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CPP48-1-35-EB

Lab Name: PNELI Contract: INEL

Lab Code: PNELI Case No.: 3021 SAS No.: SDG No.: 3021

Matrix: (soil/water) WATER

Lab Sample ID: 3021-06

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: A6817

Level: (low/med) LOW

Date Received: 03/28/91

% Moisture: not dec.

Date Analyzed: 03/29/91

Column (pack/cap) CAP

Dilution Factor: 1.0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

Number TICs found: 0

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

000014

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CPP48-1-40

Lab Name: PNELI_____ Contract: INEL_____

Lab Code: PNELI___ Case No.: 3021___ SAS No.: _____ SDG No.: 3021___

Matrix: (soil/water) SOIL___ Lab Sample ID: 3021-07_____

Sample wt/vol: ___5.0 (g/mL) G___ Lab File ID: B5921_____

Level: (low/med) LOW___ Date Received: 03/28/91

% Moisture: not dec. ___6 Date Analyzed: 04/01/91

Column: (pack/cap) CAP___ Dilution Factor: 1.0_____

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/Kg)	UG/KG
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	11	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

000015

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CPP48-1-40

Lab Name: PNELI_____ Contract: INEL_____

Lab Code: PNELI__ Case No.: 3021__ SAS No.: _____ SDG No.: 3021__

Matrix: (soil/water) SOIL__

Lab Sample ID: 3021-07_____

Sample wt/vol: __5.0 (g/mL) G__

Lab File ID: B5921_____

Level: (low/med) LOW__

Date Received: 03/28/91

% Moisture: not dec. ____6

Date Analyzed: 04/01/91

Column (pack/cap) CAP__

Dilution Factor: 1.0_____

Number TICs found: __0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====
=====	=====	=====	=====	=====

000016

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CPF48-1-45

Lab Name: PNELI_____ Contract: INEL_____

Lab Code: PNELI___ Case No.: 3021___ SAS No.: _____ SDG No.: 3021___

Matrix: (soil/water) SOIL___ Lab Sample ID: 3021-08_____

Sample wt/vol: ___5.0 (g/mL) G___ Lab File ID: B5922_____

Level: (low/med) LOW___ Date Received: 03/28/91

% Moisture: not dec. ___18 Date Analyzed: 04/01/91

Column: (pack/cap) CAP___ Dilution Factor: 1.0_____

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/Kg) UG/KG	U
74-87-3	Chloromethane	12	U
74-83-9	Bromomethane	12	U
75-01-4	Vinyl Chloride	12	U
75-00-3	Chloroethane	12	U
75-09-2	Methylene Chloride	6	U
67-64-1	Acetone	12	U
75-15-0	Carbon Disulfide	6	U
75-35-4	1,1-Dichloroethene	6	U
75-34-3	1,1-Dichloroethane	6	U
156-60-5	trans-1,2-Dichloroethene	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
67-66-3	Chloroform	6	U
107-06-2	1,2-Dichloroethane	6	U
78-93-3	2-Butanone	12	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
108-05-4	Vinyl Acetate	12	U
75-27-4	Bromodichloromethane	6	U
78-87-5	1,2-Dichloropropane	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U
79-01-6	Trichloroethene	6	U
124-48-1	Dibromochloromethane	6	U
79-00-5	1,1,2-Trichloroethane	6	U
71-43-2	Benzene	6	U
10061-02-6	Trans-1,3-Dichloropropene	6	U
75-25-2	Bromoform	6	U
108-10-1	4-Methyl-2-Pentanone	12	U
591-78-6	2-Hexanone	12	U
127-18-4	Tetrachloroethene	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
108-88-3	Toluene	6	U
108-90-7	Chlorobenzene	6	U
100-41-4	Ethylbenzene	6	U
100-42-5	Styrene	6	U
1330-20-7	Xylene (total)	6	U

000017

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CPP48-1-45

Lab Name: PNELI_____ Contract: INEL_____

Lab Code: PNELI__ Case No.: 3021__ SAS No.: _____ SDG No.: 3021__

Matrix: (soil/water) SOIL__

Lab Sample ID: 3021-08_____

Sample wt/vol: __5.0 (g/mL) G__

Lab File ID: B5922_____

Level: (low/med) LOW__

Date Received: 03/28/91

% Moisture: not dec. __18

Date Analyzed: 04/01/91

Column (pack/cap) CAP__

Dilution Factor: 1.0_____

Number TICs found: __0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====
-----	-----	-----	-----	-----

000018

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TRIP-BLANK

Lab Name: PNELI Contract: INEL

Lab Code: PNELI Case No.: 3021 SAS No.: SDG No.: 3021

Matrix: (soil/water) WATER Lab Sample ID: 3021-09

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: A6825

Level: (low/med) LOW Date Received: 03/28/91

% Moisture: not dec. Date Analyzed: 04/01/91

Column: (pack/cap) CAP Dilution Factor: 1.0

		CONCENTRATION UNITS:	
CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

000019

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

TRIP-BLANK

Lab Name: PNELI----- Contract: INEL-----
Lab Code: PNELI-- Case No.: 3021-- SAS No.: ----- SDG No.: 3021--
Matrix: (soil/water) WATER_ Lab Sample ID: 3021-09-----
Sample wt/vol: --5.0 (g/mL) ML-- Lab File ID: A6825-----
Level: (low/med) LDW-- Date Received: 03/28/91
% Moisture: not dec. ---- Date Analyzed: 04/01/91
Column (pack/cap) CAP-- Dilution Factor: 1.0-----

Number TICs found: --0
CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L--

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-----	-----	-----	-----	-----

000020

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VELKBR

Lab Name: PNELI_____ Contract: INEL_____

Lab Code: PNELI__ Case No.: 3021__ SAS No.: _____ SDG No.: 3021__

Matrix: (soil/water) SOIL_____ Lab Sample ID: VELKBR_____

Sample wt/vol: __5.0 (g/mL) G____ Lab File ID: B5904_____

Level: (low/med) LOW_____ Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 03/29/91

Column: (pack/cap) CAP_____ Dilution Factor: 1.0_____

		CONCENTRATION UNITS:	
CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	G
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

000028

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VBLKBR

Lab Name: PNELI_____ Contract: INEL_____

Lab Code: PNELI__ Case No.: 3021__ SAS No.: _____ SDG No.: 3021__

Matrix: (soil/water) SOIL__

Lab Sample ID: VBLKBR_____

Sample wt/vol: __5.0 (g/mL) G__

Lab File ID: B5904_____

Level: (low/med) LOW__

Date Received: _____

% Moisture: not dec. ____

Date Analyzed: 03/29/91

Column (pack/cap) CAF__

Dilution Factor: 1.0_____

Number TICs found: __0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====
-----	-----	-----	-----	-----

000029

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VELKAF

Lab Name: PNELI_____ Contract: INEL_____

Lab Code: PNELI__ Case No.: 3021__ SAS No.: _____ SDG No.: 3021__

Matrix: (soil/water) WATER_ Lab Sample ID: VELKAF_____

Sample wt/vol: __5.0 (g/mL) ML__ Lab File ID: A6808_____

Level: (low/med) LOW__ Date Received: _____

% Moisture: not dec. ____ Date Analyzed: 03/29/91

Column: (pack/cap) CAP__ Dilution Factor: 1.0_____

		CONCENTRATION UNITS:	
CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

000030

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VELKAF

Lab Name: FNELI_____ Contract: INEL_____

Lab Code: FNELI__ Case No.: 3021__ SAS No.: _____ SDG No.: 3021__

Matrix: (soil/water) WATER_ Lab Sample ID: VELKAF_____

Sample wt/vol: __5.0 (g/mL) ML__ Lab File ID: A6808_____

Level: (low/med) LOW__ Date Received: _____

% Moisture: not dec. ____ Date Analyzed: 03/29/91

Column (pack/cap) CAP__ Dilution Factor: 1.0_____

Number TICs found: __0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L_

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====
=====	=====	=====	=====	=====

000031

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VELKBS

Lab Name: FNELI_____ Contract: INEL_____

Lab Code: FNELI__ Case No.: 3021__ SAS No.: _____ SDG No.: 3021__

Matrix: (soil/water) SOIL__ Lab Sample ID: VELKBS_____

Sample wt/vol: __5.0 (g/mL) G__ Lab File ID: B5915_____

Level: (low/med) LOW__ Date Received: _____

% Moisture: not dec. ____ Date Analyzed: 04/01/91

Column: (pack/cap) CAP__ Dilution Factor: 1.0_____

		CONCENTRATION UNITS:	
CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

000032

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VBKBS

Lab Name: PNELI_____ Contract: INEL_____

Lab Code: PNELI__ Case No.: 3021__ SAS No.: _____ SDG No.: 3021__

Matrix: (soil/water) SOIL__ Lab Sample ID: VBKBS_____

Sample wt/vol: __5.0 (g/mL) G__ Lab File ID: B5915_____

Level: (low/med) LOW__ Date Received: _____

% Moisture: not dec. ____ Date Analyzed: 04/01/91

Column (pack/cap) CAP__ Dilution Factor: 1.0_____

Number TICs found: __0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

000033

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VELKAG

Lab Name: FNELI_____ Contract: INEL_____

Lab Code: FNELI___ Case No.: 3021___ SAS No.: _____ SDG No.: 3021___

Matrix: (soil/water) WATER___ Lab Sample ID: VELKAG_____

Sample wt/vol: ___5.0 (g/mL) ML___ Lab File ID: A6824_____

Level: (low/med) LOW___ Date Received: _____

% Moisture: not dec. ____ Date Analyzed: 04/01/91

Columns: (pack/cap) CAP___ Dilution Factor: 1.0_____

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/Kg) UG/L	g
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

000034

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VBLKAG

Lab Name: PNELI_____ Contract: INEL_____

Lab Code: PNELI__ Case No.: 3021__ SAS No.: _____ SDG No.: 3021__

Matrix: (soil/water) WATER_

Lab Sample ID: VBLKAG_____

Sample wt/vol: __5.0 (g/mL) ML__

Lab File ID: A6824_____

Level: (low/med) LOW__

Date Received: _____

% Moisture: not dec. ____

Date Analyzed: 04/01/91

Column (pack/cap) CAP__

Dilution Factor: 1.0_____

CONCENTRATION UNITS:

Number TICs found: __0

(ug/L or ug/Kg) UG/L_

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====
-----	-----	-----	-----	-----

000035

ORGANIC DATA ASSESSMENT SUMMARY

PROJECT NO. 893-1195.530 SITE INEL
LABORATORY PNELI SAMPLES/MATRIX 7/50.7
SDG # Lob ID (3021) / CPP48-1 1-TB, 1-ED

DATA ASSESSMENT SUMMARY

	<u>VOA</u>	BNA	PEST	OTHER
1. HOLDING TIMES	<u>0</u>			
2. GC/MS TUNE/INSTR. PERFORM	<u>0</u>			
3. CALIBRATIONS	<u>0</u>			
4. BLANKS	<u>0</u>			
5. SURROGATES	<u>0</u>			
6. MATRIX SPIKE/DUP	<u>0</u>			
7. OTHER QC	<u>0</u>			
8. INTERNAL STANDARDS	<u>0</u>			
9. COMPOUND IDENTIFICATION	<u>0</u>			
10. SYSTEM PERFORMANCE	<u>0</u>			
11. OVERALL ASSESSMENT	<u>0</u>			

0 = Data had no problems/or qualified due to minor problems.

M = Data qualified due to major problems.

Z = Data unacceptable.

X = Problems, but do not affect data.

NOTES: Data acceptable for use as
reported by the laboratory.

Validated by: Dennis R. Roman Date: 5/1/91

Reviewed by: _____ Date: _____

Acceptable
YES NO

1. Holding Times ----- ✓

All samples analyzed within 6 days of collection.

2. GC/MS Tuning ----- ✓

Norm V VOA present for each 12 hr period. recalc. SD/95
174/95, 175/174 & 176/174 no trans. errors, no calc. errors.

3. Calibration ----- ✓

Recalc. ^{RRFs} for ^{1,1-DCE} PCE - IC. 2/4/91 - Vinyl Acetate ^{VOA1 - inst.} ~~90.0~~ 33.62 RSD

- VOA2 - inst - OK ✓ Cont. Cal. - VOA1 - inst - OK ✓ -

- VOA2 - inst - 3/29/91 Acetone %D = -47.7 / ~~4/6/91 Vinyl Acet. %D = -25.8~~ OK DKR

4. Blanks ----- ✓

Field / No detects - TB, EB - Acet: 46 ug/l; CS₂: 15 ug/l; 2-But.: 3 ug/l
Method (LAB) / No detects on any method blank

5. Surrogate Recovery ----- ✓

All surrogate recoveries within specification.
No calc. or transcription errors.

6. Matrix Spike/Matrix Spike Duplicates ----- ✓

No Calc or Transcription errors. All MS/MSD
%R and %RPD within advisory limits.

7. Field Duplicates ----- N/A

No Field Duplicates submitted.

SDG # CPL48-01 Project No. 893-1195

Acceptable
YES NO

8. Internal Standards Performance ----- ☒

No Transcription Errors, All IS areas and retention times are within criteria

9. TCL Compound Identification ----- ☒

RRT(s) within ± 0.06 RRT units, no ^{major} ~~minor~~ peaks ~~unaccounted~~ for on chromatograms.

10. Compound Quant. and Reported Detection Limits -- ☒

Compound Quant and Reported Detection Limits - OK ☒

11. Tentatively Identified Compounds ----- ☒

Lab conducted mass spectral search as required. and reported.

12. System Performance ----- ☒

No baseline rise, extraneous peaks, loss of resolution, etc.

13. Overall Assessment ----- ☒

Data as reported by the laboratory is acceptable for use.

APPENDIX E

APPENDIX VIII ANALYSIS RESULTS

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.
CPP48-1-10

CPF001

Lab Name: GULF SOUTH ENVIRNOMENTAL

Contract:

Lab Code: GSELI

Case No.:

SAS No.:

SDS No.: 600001

Matrix (soil/water): SOIL

Lab Sample ID: FZM-01

Level (low/med): LOW

Date Received: 03/28/91

% Solids: 92.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony	2.2	B	N	P
7440-38-2	Arsenic	3.1		*	F
7440-39-3	Barium	61.3			P
7440-41-7	Beryllium	0.16	B		P
7440-43-9	Cadmium	0.27	E		P
7440-70-2	Calcium				
7440-47	Chromium	17.4			P
7440-48-4	Cobalt	3.9			P
7440-50-8	Copper	10.5		E	P
7439-87-6	Iron				
7439-92-1	Lead	6.3		N*	F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-3	Mercury	0.19	U		CV
7440-02-0	Nickel	18.9			P
7440-09-7	Potassium				
7782-49-2	Selenium	0.34	B		F
7440-22-4	Silver	0.12	U	N	P
7440-23-5	Sodium				
7440-28-0	Thallium	0.76	U		F
7440-62-2	Vanadium	18.0			P
7440-66-6	Zinc	45.2			F
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

Analytical Results - Conventional Parameters
Golder & Associates

Client ID: CPP 48-1-10
Description: NA
GSELI ID: FZM-001
Matrix: Soil
Wet/Dry Basis: Wet

(1) Collected: 3/26/91
Received: 3/28/91
Prepared: see below
Analyzed: see below
Percent Moisture: NA

<u>P a r a m e t e r</u>	<u>M e t h o d</u>	<u>U n i t s</u>	<u>S a m p l e</u>	<u>B l a n k</u>	<u>D e t e c t i o n</u> <u>L i m i t</u>	<u>D a t e</u> <u>P r e p a r e d</u>	<u>D a t e</u> <u>A n a l y z e d</u>
Chloride	325.3	mg/kg	2.77	ND	1.38	4/9/91	4/9/91
Cyanide, Total	9010	mg/kg	ND	ND	2.5	4/10/91	4/10/91
Fluoride (Dist.)	340.1	mg/kg	5.20	ND	0.1	4/10/91	4/10/91
Nitrate/Nitrite	353.3	mg/kg	3.84	ND	0.025	4/5/91	4/8/91
pH	150.1	pH	8.42	NA	NA	4/2/91	4/2/91
Phenols	420.1	mg/kg	ND	ND	0.45	4/5/91	4/5/91
Sulfate	375.4	mg/kg	131.3	ND	50.0	4/10/91	4/10/91
Sulfide	376.2	mg/kg	1.56	ND	1.0	4/1/91	4/2/91
Tin	282.1	mg/kg	0.03	ND	25.0	4/1/91	4/8/91

ND-Not Detected at or above the detection limit stated.

(1) Collection date from chain-of-custody.

000001

FOOTNOTES
GOLDER
GULF SOUTH ENVIRONMENTAL LABORATORY

- A - Standard available for this compound; instrument calibration performed for this specific analyte.
- B - Standard not available for this compound; detection limits are estimates based on those of structurally similar compounds.
- C - Standard not available for this compound; detection limits are unknown.
- D - This compound probably would not be detected under the conditions used for the analyses.

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CFP-48-1-10

Lab Name: G S E L I

Contract: 8931195850

Lab Code: GULF

Case No.: GOLDER

SAS No.: _____

SDG No.: _____

Matrix: (soil/water) SOIL

Lab Sample ID: FZM01

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: VDFZM01

Level: (low/med) LOW

Date Received: 03/28/91

% Moisture: not dec. 8

Date Analyzed: 04/09/91

Column: (pack/cap) CAP

Dilution Factor: 1.0

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/KG

Q

107-05-1-----	Allyl Chloride	11	UA
598-31-2-----	Bromoacetone	11	UB
106-89-8-----	1-Chloro-2,3-epoxypropane	54	UB
124-48-1-----	Chlorodibromomethane	5	UA
110-75-8-----	2-Chloroethylvinyl ether	11	UA
107-30-2-----	Chloromethyl methyl ether	0	UC
126-99-8-----	Chloroprene	0	UC
4170-30-3-----	Crotonaldehyde	27	UB
96-12-8-----	1,2-Dibromo-3-chloropropane	11	UA
107-06-2-----	1,2-Dibromoethane	11	UA
764-41-0-----	trans-1,4-Dichloro-2-butene	5	UA
75-71-8-----	Dichlorodifluoromethane	11	UB
156-60-5-----	1,2-Trans-dichloroethylene	5	UA
142-28-9-----	1,3-Dichloropropane	5	UB
78-88-6-----	2,3-Dichloropropene	5	UB
1464-53-5-----	1,2,3,4-Diepoxybutane	0	UC
616-40-0-----	N,N-Diethylhydrazine	0	UC
123-91-1-----	1,4-Dioxane	110	UA
107-12-0-----	Ethylcyanide	11	UA
76-13-1-----	Freon TF	5	UB
50-00-0-----	Formaldehyde	0	UC
74-88-4-----	Iodomethane	5	UA
78-83-1-----	Isobutyl alcohol	110	UA
126-98-7-----	Methacrylonitrile	27	UA
60-34-4-----	Methyl hydrazine	0	UC
123-63-7-----	Paraldehyde	0	UC
76-01-7-----	Pentachloroethane	5	UB
600-20-6-----	1,1,1,2-Tetrachloroethane	5	UA
509-14-8-----	Tetranitromethane	0	UC
75-70-7-----	Trichloromethanethiol	0	UC
75-69-4-----	Trichlorofluoromethane	5	UA
598-77-6-----	1,1,2-Trichloropropane	11	UB
3175-23-3-----	1,2,2-Trichloropropane	11	UB
96-18-4-----	1,2,3-Trichloropropane	11	UA

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CPP-48-1-10

Lab Name: G S E L I Contract: 8931195850

Lab Code: GULF Case No.: GOLDER SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: FZM01

Sample wt/vol: 5.0 (g/mL) G Lab File ID: VDFZM01

Level: (low/med) LOW Date Received: 03/28/91

% Moisture: not dec. 8 Date Analyzed: 04/09/91

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0 CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CPP-48-1-10RE

Lab Name: G S E L I

Contract: 8931195850

Lab Code: GULF Case No.: GOLDER SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL

Lab Sample ID: FZM01RE

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: VOFZM01R2

Level: (low/med) LOW

Date Received: 03/28/91

% Moisture: not dec. 8

Date Analyzed: 04/10/91

Column: (pack/cap) CAP

Dilution Factor: 1.0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO.

COMPOUND

Q

74-87-3	Methyl Chloride	11	UA
74-83-9	Methyl Bromide	11	UA
75-01-4	Vinyl Chloride	11	UA
75-00-3	Chloroethane	11	UA
75-09-2	Methylene Chloride	6	BA
67-64-1	Acetone	6	JA
75-15-0	Carbon Disulfide	5	UA
75-35-4	1,1-Dichloroethylene	5	UA
75-34-3	1,1-Dichloroethane	5	UA
67-66-3	Chloroform	11	UA
107-06-2	1,2-Dichloroethane	5	UA
78-93-3	Methyl ethyl ketone	11	UA
71-55-6	1,1,1-Trichloroethane	5	UA
56-23-5	Carbon Tetrachloride	5	UA
108-05-4	Vinyl Acetate	11	UA
75-27-4	Dichlorobromomethane	5	UA
78-87-5	1,2-Dichloropropane	5	UA
10061-01-5	cis-1,3-Dichloropropylene	5	UA
79-01-6	Trichloroethylene	5	UA
124-48-1	Dibromochloromethane	5	UA
79-00-5	1,1,2-Trichloroethane	5	UA
71-43-2	Benzene	5	UA
10061-02-6	Trans-1,3-Dichloropropylene	5	UA
75-25-2	Bromoform	5	UA
108-10-1	4-Methyl-2-Pentanone	11	UA
591-78-6	2-Hexanone	11	UA
127-18-4	Tetrachloroethylene	5	UA
79-34-5	1,1,2,2-Tetrachloroethane	5	UA
108-88-3	Toluene	5	UA
108-90-7	Chlorobenzene	5	UA
100-41-4	Ethylbenzene	5	UA
100-42-5	Styrene	5	UA
1330-20-7	Xylene (total)	5	UA
75-08-8	Acetonitrile	27	UA
107-02-8	Acrolein	27	UA
107-13-1	Acrylonitrile	27	UA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CPP-48-1-10RE

Lab Name: G S E L I

Contract: 8931195850

Lab Code: GULF

Case No.: GOLDER

SAS No.: _____

SDG No.: _____

Matrix: (soil/water) SOIL

Lab Sample ID: FZM01RE

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: VDFZM01R2

Level: (low/med) LOW

Date Received: 03/28/91

% Moisture: not dec. 8

Date Analyzed: 04/10/91

Column: (pack/cap) CAP

Dilution Factor: 1.0

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/KG

Q

107-05-1	Allyl Chloride	11	UA
598-31-2	Bromoacetone	11	UB
106-89-8	1-Chloro-2,3-epoxypropane	54	UB
124-48-1	Chlorodibromomethane	5	UA
110-75-8	2-Chloroethylvinyl ether	11	UA
107-30-2	Chloromethyl methyl ether	0	UC
126-99-8	Chloroprene	0	UC
4170-30-3	Crotonaldehyde	27	UB
96-12-8	1,2-Dibromo-3-chloropropane	11	UA
107-06-2	1,2-Dibromoethane	11	UA
764-41-0	trans-1,4-Dichloro-2-butene	5	UA
75-71-8	Dichlorodifluoromethane	11	UB
156-60-5	1,2-Trans-dichloroethylene	5	UA
142-28-9	1,3-Dichloropropane	5	UB
78-88-6	2,3-Dichloropropene	5	UB
1464-53-5	1,2,3,4-Diepoxybutane	0	UC
616-40-0	N,N-Diethylhydrazine	0	UC
123-91-1	1,4-Dioxane	110	UA
107-12-0	Ethylcyanide	11	UA
76-13-1	Freon TF	5	UB
50-00-0	Formaldehyde	0	UC
74-88-4	Iodomethane	5	UA
78-83-1	Isobutyl alcohol	110	UA
126-98-7	Methacrylonitrile	27	UA
60-34-4	Methyl hydrazine	0	UC
123-63-7	Paraldehyde	0	UC
76-01-7	Pentachloroethane	5	UB
600-20-6	1,1,1,2-Tetrachloroethane	5	UA
509-14-8	Tetranitromethane	0	UC
75-70-7	Trichloromethanethiol	0	UC
75-69-4	Trichlorofluoromethane	5	UA
598-77-6	1,1,2-Trichloropropane	11	UB
3175-23-3	1,2,2-Trichloropropane	11	UB
96-18-4	1,2,3-Trichloropropane	11	UA

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CFP-48-1-10RE

Lab Name: G S E L I Contract: 8931195850

Lab Code: GULF Case No.: GOLDER SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: FZM01RE

Sample wt/vol: 5.0 (g/mL) G Lab File ID: VOFZM01R2

Level: (low/med) LOW Date Received: 03/28/91

% Moisture: not dec. 8 Date Analyzed: 04/10/91

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0 CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-----	-----	-----	-----	-----

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CPP-48-1-10

Lab Name: G S E L I Contract: 8931195850

Lab Code: GULF Case No.: GOLDER SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: FZM01

Sample wt/vol: 30.0 (g/mL) G Lab File ID: SVFZM01

Level: (low/med) LOW Date Received: 03/28/91

% Moisture: not dec. 8 dec. _____ Date Extracted: 04/02/91

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 04/08/91

GPC Cleanup: (Y/N) N pH: 8.2 Dilution Factor: 1.00

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/KG Q

108-95-2-----	Phenol	360	UA
111-44-4-----	bis(2-Chloroethyl)Ether	360	UA
95-57-8-----	2-Chlorophenol	360	UA
541-73-1-----	1,3-Dichlorobenzene	360	UA
106-46-7-----	1,4-Dichlorobenzene	360	UA
100-51-6-----	Benzyl Alcohol	360	UA
95-50-1-----	1,2-Dichlorobenzene	360	UA
95-48-7-----	o-Cresol	360	UA
108-60-1-----	bis(2-Chloroisopropyl)Ether	360	UA
106-44-5-----	p-Cresol	360	UA
621-64-7-----	N-Nitroso-Di-n-Propylamine	360	UA
67-72-1-----	Hexachloroethane	360	UA
98-95-3-----	Nitrobenzene	360	UA
78-59-1-----	Isophorone	360	UA
88-75-5-----	2-Nitrophenol	360	UA
105-67-9-----	2,4-Dimethylphenol	360	UA
65-85-0-----	Benzoic Acid	1700	UA
111-91-1-----	bis(2-Chloroethoxy)Methane	360	UA
120-83-2-----	2,4-Dichlorophenol	360	UA
120-82-1-----	1,2,4-Trichlorobenzene	360	UA
91-20-3-----	Naphthalene	360	UA
106-47-8-----	p-Chloroaniline	360	UA
87-68-3-----	Hexachlorobutadiene	360	UA
59-50-7-----	p-Chloro-m-cresol	360	UA
91-57-6-----	2-Methylnaphthalene	360	UA
77-47-4-----	Hexachlorocyclopentadiene	360	UA
88-06-2-----	2,4,6-Trichlorophenol	360	UA
95-95-4-----	2,4,5-Trichlorophenol	1700	UA
91-58-7-----	2-Chloronaphthalene	360	UA
88-74-4-----	2-Nitroaniline	1700	UA
131-11-3-----	Dimethyl Phthalate	360	UA
208-96-8-----	Acenaphthylene	360	UA
606-20-2-----	2,6-Dinitrotoluene	360	UA

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CPP-48-1-10

Lab Name: G S E L I Contract: 8931195850

Lab Code: GULF Case No.: GOLDER SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: FZM01

Sample wt/vol: 30.0 (g/mL) G Lab File ID: SVFZM01

Level: (low/med) LOW Date Received: 03/28/91

% Moisture: not dec. 8 dec. _____ Date Extracted: 04/02/91

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 04/08/91

GPC Cleanup: (Y/N) N pH: 8.2 Dilution Factor: 1.00

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/KG Q

99-09-2-----	3-Nitroaniline	1700	UA
83-32-9-----	Acenaphthene	360	UA
51-28-5-----	2,4-Dinitrophenol	1700	UA
100-02-7-----	4-Nitrophenol	1700	UA
132-64-9-----	Dibenzofuran	360	UA
121-14-2-----	2,4-Dinitrotoluene	360	UA
84-66-2-----	Diethylphthalate	360	UA
7005-72-3-----	4-Chlorophenyl-phenylether	360	UA
86-73-7-----	Fluorene	360	UA
100-01-6-----	4-Nitroaniline	1700	UA
534-52-1-----	4,6-Dinitro-2-Methylphenol	1700	UA
86-30-6-----	N-Nitrosodiphenylamine (1)	360	UA
101-55-3-----	4-Bromophenyl-phenylether	360	UA
118-74-1-----	Hexachlorobenzene	360	UA
87-86-5-----	Pentachlorophenol	1700	UA
85-01-8-----	Phenanthrene	360	UA
120-12-7-----	Anthracene	360	UA
84-74-2-----	Di-n-Butylphthalate	360	UA
206-44-0-----	Fluoranthene	360	UA
129-00-0-----	Pyrene	360	UA
85-68-7-----	Butylbenzylphthalate	360	UA
91-94-1-----	3,3'-Dichlorobenzidine	720	UA
56-55-3-----	Benzo(a)Anthracene	360	UA
218-01-9-----	Chrysene	360	UA
117-81-7-----	bis(2-Ethylhexyl)Phthalate	360	UA
117-84-0-----	Di-n-Octyl Phthalate	360	UA
205-99-2-----	Benzo(b)Fluoranthene	360	UA
207-08-9-----	Benzo(k)Fluoranthene	360	UA
50-32-8-----	Benzo(a)Pyrene	360	UA
193-39-5-----	Indeno(1,2,3-cd)Pyrene	360	UA
53-70-3-----	Dibenz(a,h)Anthracene	360	UA
191-24-2-----	Benzo(g,h,i)Perylene	360	UA
98-86-2-----	Acetophenone	360	UA
53-96-3-----	2-Acetylaminofluorene	360	UA

(1) - Cannot be separated from Diphenylamine

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CPP-48-1-10

Lab Name: G S E L I Contract: 8931195850
 Lab Code: GULF Case No.: GOLDER SAS No.: _____ SDG No.: _____
 Matrix: (soil/water) SOIL Lab Sample ID: FZM01
 Sample wt/vol: 30.0 (g/mL) G Lab File ID: SVFZM01
 Level: (low/med) LOW Date Received: 03/28/91
 Moisture: not dec. 8 dec. _____ Date Extracted: 04/02/91
 Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 04/08/91
 SPC Cleanup: (Y/N) N pH: 8.2 Dilution Factor: 1.00

CAS NO. COMPOUND CONCENTRATION UNITS:
 (ug/L or ug/Kg) UG/KG Q

1402-68-2-----	Aflatoxins, Total	0	UC
92-67-1-----	4-Aminobiphenyl	360	UA
1072-67-9-----	5-(Aminomethyl)-3-isoxazolol	0	UC
62-53-3-----	Aniline	360	UA
140-57-8-----	Aramite	360	UA
492-80-8-----	Auramine	0	UC
225-51-4-----	Benzo(c)acridine	360	UB
100-44-7-----	Benzyl Chloride	360	UB
108-98-5-----	Benezenthionol	0	UC
205-82-3-----	Benzo(j)fluoranthene	360	UB
98-07-7-----	Benzotrichloride	360	UB
106-51-4-----	p-Benzoquinone	360	UB
357-57-3-----	Brucine	0	UC
13-38-23-4-----	2-Butanone Peroxide	360	UA
88-85-7-----	2-sec-Butyl-4,6-dinitrophenol	1700	UA
494-03-1-----	Chloronaphazine	0	UC
90-13-1-----	1-Chloronaphthalene	360	UB
542-76-7-----	3-Chloropropionitrile	0	UC
108-39-4-----	m-Cresol	360	UA
131-89-5-----	2-Cyclohexyl-4,6-dinitrophenol	1700	UB
226-36-8-----	Dibenzo(a,h)acridine	1700	UB
224-42-0-----	Dibenzo(a,j)acridine	360	UB
192-65-4-----	Dibenzo(a,e)pyrene	360	UB
159-55-9-----	Dibenzo(a,i)pyrene	360	UB
194-59-2-----	7H-Dibenzo(c,g)carbazole	360	UB
91-94-1-----	3,3-Dichlorobenzidine	720	UA
98-87-3-----	Dichloromethylbenzene	360	UB
87-65-0-----	2,6-Dichlorophenol	360	UB
696-28-6-----	Dichlorophenylarsine	0	UC
94-58-6-----	Dihydrosafrole	360	UB
55-91-4-----	Diisopropylfluorophosphate	0	UC
60-11-7-----	p-Dimethylaminoazobenzene	360	UA
57-77-6-----	7,12Dimethylbenzo(a)anthracene	360	UB

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CPP-48-1-10

Lab Name: G S E L I Contract: 8931195850Lab Code: GULF Case No.: GOLDER SAS No.: _____ SDG No.: _____Matrix: (soil/water) SOIL Lab Sample ID: FZM01Sample wt/vol: 30.0 (g/mL) G Lab File ID: SVFZM01Level: (low/med) LOW Date Received: 03/28/91% Moisture: not dec. 8 dec. _____ Date Extracted: 04/02/91Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 04/08/91GPC Cleanup: (Y/N) N pH: 8.2 Dilution Factor: 1.00

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/KG Q

57-14-7-----	1,1-Dimethylhydrazine	0	UC
540-73-8-----	1,2-Dimethylhydrazine	0	UC
122-09-8-----	a-a-Dimethylphenethylamine	720	UB
77-78-1-----	Dimethyl Sulfate	0	UC
99-65-0-----	m-Dinitrobenzene	360	UB
122-39-4-----	Diphenylamine	360	UA
122-66-7-----	1,2-Diphenylhydrazine	360	UA
541-53-7-----	2,4-Dithiobiuret	0	UC
145-73-7-----	Endothal	0	UC
97-63-2-----	Ethyl Methacrylate	360	UA
62-50-0-----	Ethyl Methanesulfonate	360	UA
64-18-6-----	Formic Acid	0	UD
70-30-4-----	Hexachlorophene	0	UD
1888-71-7-----	Hexachloropropene	360	UA
757-58-4-----	Hexaethyltetraphosphate	0	UC
302-01-2-----	Hydrazine	0	UD
120-58-1-----	Isosafrole	360	UA
108-31-6-----	Maleic Anhydride	0	UC
148-82-3-----	Melphalan	0	UC
91-80-5-----	Methapyrilene	360	UA
56-49-5-----	3-Methylcholanthrene	360	UA
80-62-6-----	Methyl Methacrylate	360	UA
101-14-4-----	4,4-Methylenbis(2-chloroanil)	0	UC
75-86-5-----	2-Methylactonitrile	0	UC
66-27-3-----	Methyl Methanesulfonate	360	UB
5751-20-2-----	N-Methyl-N-nitrosos-N-nitrogu	0	UC
636-26-0-----	Methylthiouracil	0	UC
130-15-4-----	1,4-Napthoquinoline	360	UA
134-32-7-----	1-Napthylamine	720	UA
91-59-8-----	2-Napthylamine	720	UA
934-16-3-----	N-Nitrosodi-n-butylamine	360	UA
1116-54-7-----	N-Nitrosodiethanolamine	0	UC
55-18-5-----	N-Nitrosodiethylamine	360	UA
63-75-9-----	N-Nitrosodimethylamine	720	UA

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CPP-48-1-10

Lab Name: G S E L I Contract: 8931195850

Lab Code: GULF Case No.: GOLDER SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: FZM01

Sample wt/vol: 30.0 (g/mL) G Lab File ID: SVFZM01

Level: (low/med) LOW Date Received: 03/28/91

% Moisture: not dec. 8 dec. _____ Date Extracted: 04/02/91

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 04/08/91

GPC Cleanup: (Y/N) N pH: 8.2 Dilution Factor: 1.00

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/KG Q

10595-95-6	N-Nitrosomethylethylamine	360	UA
615-53-2	N-Nitroso-n-methylurethane	0	UC
4549-40-0	N-Nitrosomethylvinylamine	360	UB
59-89-2	N-Nitrosomorpholine	360	UA
16543-55-9	N-Nitrosornicotine	0	UC
56-57-5	N-Nitroquinoline-n-oxide	360	UA
100-75-4	N-Nitrosopiperidine	360	UA
930-55-2	N-Nitrosopyrrolidine	360	UA
86-30-6	N-Nitrosodiphenylamine	360	UA
13256-22-9	N-Nitrososarcosine	0	UC
99-55-8	5-Nitro-o-toluidine	360	UA
152-16-7	Octamethylpyrophosphoramidate	0	UC
-----	Paraoxon	0	UC
608-93-5	Pentachlorobenzene	360	UA
76-01-7	Pentachloroethane	360	UA
82-68-8	Pentachloronitrobenzene	360	UA
62-44-2	Phenacetin	360	UA
106-50-3	p-Phenylenediamine	1700	UA
85-44-9	Phthalic Anhydride	0	UC
23950-58-5	Pronamide	360	UA
1120-71-4	1,3-Propane Sultone	0	UC
107-10-8	n-Propylamine	0	UC
51-52-5	Propylthiouracil	0	UC
110-86-1	Pyridine	720	UA
108-46-3	Resorcinol	720	UB
81-07-2	Saccharin	0	UC
94-59-7	Safrole	360	UA
634-66-2	1,2,3,4-Tetrachlorobenzene	360	UB
634-90-2	1,2,3,5-Tetrachlorobenzene	360	UB
95-94-3	1,2,4,5-Tetrachlorobenzene	360	UA
58-90-2	2,3,4,6-Tetrachlorophenol	360	UB
95-53-4	o-Toluidine	360	UA
137-26-8	Thioram	0	UC
99-35-4	sym-Trinitrobenzene	360	UA

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CPP-48-1-10

Lab Name: G S E L I Contract: 8931195850Lab Code: GULF Case No.: GOLDER SAS No.: _____ SDG No.: _____Matrix: (soil/water) SOIL Lab Sample ID: FZM01Sample wt/vol: 30.0 (g/mL) G Lab File ID: SVFZM01Level: (low/med) LOW Date Received: 03/28/91% Moisture: not dec. 8 dec. _____ Date Extracted: 04/02/91Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 04/08/91GPC Cleanup: (Y/N) N pH: 8.2 Dilution Factor: 1.00

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/KG Q

52-24-4-----	tris(1-Azridinyl)phosphine su	0	UC
126-72-7-----	tris(2,3-Dibromopropyl)phosph	0	UC
935-75-5-----	2,3,5,6-Tetrachlorophenol	360	UA
4901-51-3-----	2,3,4,5-Tetrachlorophenol	360	UA
3196-13-2-----	Thiofanox	0	UC
87-61-6-----	1,2,3-Trichlorobenzene	360	UB
108-70-3-----	1,3,5-Trichlorobenzene	360	UB
66-75-1-----	Uracil Mustard	0	UC
109-06-8-----	2-Picoline	0	UA

FORM I SV-6

1/87 Rev.

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CPP-48-1-10

Lab Name: G S E L I Contract: 8931195850

Lab Code: GULF Case No.: GOLDER SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: FZM01

Sample wt/vol: 30.0 (g/mL) G Lab File ID: SVFZM01

Level: (low/med) LOW Date Received: 03/28/91

% Moisture: not dec. 8 dec. _____ Date Extracted: 04/02/91

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 04/08/91

GPC Cleanup: (Y/N) N pH: 8.2 Dilution Factor: 1.00

Number TICs found: 0
CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE No

CPP48-1-10

Lab Name: GULF SOUTH ENVIRONMENTAL LABORATORY Client: GOLDER

Lab Code: GULF Case No: 8931195850 SAS No: _____ SDG No: _____

Matrix: SOIL

Lab Sample ID: FZM-01

Sample wt : 30 g

Lab File ID(1): G:A221733
(2):

Moisture: not dec: 8% dec: _____% Date Received: 03-28-91

Extraction: SONC

Date Extracted: 04-02-91

Concentrated Extract Volume: 10000 ul Date Analyzed: 04-10-91

Injection Volume: 1.0 ul

Dilution Factor: 1.0

GPC Cleanup (Y/N): N pH: 8.2 Sulfur Cleanup (Y/N): N

CAS No.	COMPOUND	CONCENTRATION ug/Kg	Q
319-84-6	alpha-BHC	8.7	U
319-85-7	beta-BHC	8.7	U
319-86-8	delta-BHC	8.7	U
58-89-9	gamma-BHC (Lindane)	8.7	U
76-44-8	Heptachlor	8.7	U
309-00-2	Aldrin	8.7	U
1024-57-3	Heptachlor epoxide	8.7	U
959-98-8	Endosulfan I	8.7	U
60-57-1	Dieldrin	17	U
72-55-9	4,4'-DDE	17	U
72-20-8	Endrin	17	U
33213-65-9	Endosulfan II	17	U
72-54-8	4,4'-DDD	17	U
1031-07-8	Endosulfan sulfate	17	U
50-29-3	4,4'-DDT	17	U
72-43-5	Methoxychlor	87	U
7421-93-4	Endrin aldehyde	17	U
57-74-9	Chlordane	87	U
8001-35-2	Toxaphene	170	U
12674-11-2	Aroclor 1016	87	U
11104-28-2	Aroclor 1221	87	U
11141-16-5	Aroclor 1232	87	U
53469-21-9	Aroclor 1242	87	U
12672-29-6	Aroclor 1248	87	U
11097-69-6	Aroclor 1254	170	U
11096-82-5	Aroclor 1260	170	U

Target Compound List E:\DATA\8080L.TCL

10:50:50 04-11-1991

FRM1Xv61

03/90 rev.

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE No

CPP48-1-10

Lab Name: GULF SOUTH ENVIRONMENTAL LABORATORY Client: GOLDER

Lab Code: GULF Case No: 8931195850 SAS No: _____ SDG No: _____

Matrix: SOIL

Lab Sample ID: FZM-01

Sample wt : 30 g

Lab File ID(1): G:A221733
(2):

Moisture: not dec: 8% dec: _____% Date Received: 03-28-91

Extraction: SONC

Date Extracted: 04-02-91

Concentrated Extract Volume: ~~1000~~ ul Date Analyzed: 04-10-91

Injection Volume: 1.0 ul

Dilution Factor: 1.0

GPC Cleanup (Y/N): N pH: 8.2 Sulfur Cleanup (Y/N): N

CAS No.	COMPOUND	CONCENTRATION ug/Kg	Q
510-15-6	Chlorobenzilate	87	U
2303-16-4	Diallate	87	U
465-73-6	Isodrin	17	U
143-50-0	Kepone	870	U

Target Compound List E:\DATA\A9ECDL.TCL

17:37:06 04-11-1991
FRM1Xv61
03/90 rev.

Device fault error 70 .

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE No

CPP-48-1-10 GO

Lab Name: GULF SOUTH ENVIRONMENTAL LABORATORY Client: GOLDER

Lab Code: GULF Case No: 8931195850 SAS No: _____ SDG No: _____

Matrix: SOIL

Lab Sample ID: FZM-01

Sample wt : 30 g

Lab File ID(1): J:A623711
(2):

Moisture: not dec: 8% dec: _____% Date Received: 03-28-91

Extraction: SONC

Date Extracted: 04-01-91

Concentrated Extract Volume: 1000 ul Date Analyzed: 04- 9-91

Injection Volume: 1.0 ul

Dilution Factor: 1.0

GPC Cleanup (Y/N): N pH: 8.2 Sulfur Cleanup (Y/N): N

CAS No.	COMPOUND	CONCENTRATION ug/Kg	Q
126-68-1	O,O,O-Triethylphosphorothi	73	U
297-97-2	Thionazin	73	U
298-02-2	Phorate	73	U
3689-24-5	Tetraethyldithropyrophosph	73	U
298-04-4	Disulfoton	73	U
60-51-5	Dimethoate	73	U
298-00-0	Methyl parathion	73	U
56-38-2	Parathion	73	U
52-85-7	Famphur	73	U

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE No

CPP-48-1-10 G

Lab Name: GULF SOUTH ENVIRONMENTAL LABORATORY Client: GOLDER

Lab Code: GULF Case No: 8931195850 SAS No: _____ SDG No: _____

Matrix: SOIL Lab Sample ID: FZM-01

Sample wt : 50 g Lab File ID(1): G:A221661

Moisture: not dec: 8% dec: _____% Date Received: 03-28-91

Extraction: SONC Date Extracted: 04-01-91

Concentrated Extract Volume: low ul Date Analyzed: 04- 5-91

Injection Volume: 1.0 ul Dilution Factor: 1.0

GPC Cleanup (Y/N): N pH: 8.2 Sulfur Cleanup (Y/N): N

CAS No.	COMPOUND	CONCENTRATION ug/Kg	Q
94-75-7	2,4-D	260	U
93-72-1	2,4,5-TP (Silvex)	37	U
93-76-5	2,4,5-T	44	U

Target Compound List E:\DATA\HERBL.TCL

20:15:45 04-09-1991
FRM1Xv61
03/90 rev

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TRIP BLANK

Lab Name: G S E L I Contract: 8931195850

Lab Code: GULF Case No.: GOLDER SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: FZM02

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VDFZM02R

Level: (low/med) LOW Date Received: 03/28/91

% Moisture: not dec. _____ Date Analyzed: 04/09/91

Column: (pack/cap) CAP Dilution Factor: 1.0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L Q

CAS NO.	COMPOUND		
74-87-3	Methyl Chloride	10	UA
74-83-9	Methyl Bromide	10	UA
75-01-4	Vinyl Chloride	10	UA
75-00-3	Chloroethane	10	UA
75-09-2	Methylene Chloride	5	UA
67-64-1	Acetone	4	JBA
75-15-0	Carbon Disulfide	5	UA
75-35-4	1,1-Dichloroethylene	5	UA
75-34-3	1,1-Dichloroethane	5	UA
67-66-3	Chloroform	10	UA
107-06-2	1,2-Dichloroethane	5	UA
78-93-3	Methyl ethyl ketone	10	UA
71-55-6	1,1,1-Trichloroethane	5	UA
56-23-5	Carbon Tetrachloride	5	UA
108-05-4	Vinyl Acetate	10	UA
75-27-4	Dichlorobromomethane	5	UA
78-87-5	1,2-Dichloropropane	5	UA
10061-01-5	cis-1,3-Dichloropropylene	5	UA
79-01-6	Trichloroethylene	5	UA
124-48-1	Dibromochloromethane	5	UA
79-00-5	1,1,2-Trichloroethane	5	UA
71-43-2	Benzene	5	UA
10061-02-6	Trans-1,3-Dichloropropylene	5	UA
75-25-2	Bromoform	5	UA
108-10-1	4-Methyl-2-Pentanone	10	UA
591-78-6	2-Hexanone	10	UA
127-18-4	Tetrachloroethylene	5	UA
79-34-5	1,1,2,2-Tetrachloroethane	5	UA
108-88-3	Toluene	5	UA
108-90-7	Chlorobenzene	5	UA
100-41-4	Ethylbenzene	5	UA
100-42-5	Styrene	5	UA
1330-20-7	Xylene (total)	5	UA
75-08-8	Acetonitrile	25	UA
107-02-8	Acrolein	25	UA
107-13-1	Acrylonitrile	25	UA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TRIP_BLANK

Lab Name: G S E L I Contract: 8931195850

Lab Code: GULF Case No.: GOLDER SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: FZM02

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VDFZM02R

Level: (low/med) LOW Date Received: 03/28/91

% Moisture: not dec. _____ Date Analyzed: 04/09/91

Column: (pack/cap) CAP Dilution Factor: 1.0

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/L Q

107-05-1	Allyl Chloride	10	UA
598-31-2	Bromoacetone	10	UB
106-89-8	1-Chloro-2,3-epoxypropane	50	UB
124-48-1	Chlorodibromomethane	5	UA
110-75-8	2-Chloroethylvinyl ether	10	UA
107-30-2	Chloromethyl methyl ether	0	UC
126-99-8	Chloroprene	0	UC
4170-30-3	Crotonaldehyde	25	UB
96-12-8	1,2-Dibromo-3-chloropropane	10	UA
107-06-2	1,2-Dibromoethane	10	UA
764-41-0	trans-1,4-Dichloro-2-butene	5	UA
75-71-8	Dichlorodifluoromethane	10	UB
156-60-5	1,2-Trans-dichloroethylene	5	UA
142-28-9	1,3-Dichloropropane	5	UB
78-88-6	2,3-Dichloropropene	5	UB
1464-53-5	1,2,3,4-Diepoxybutane	0	UC
616-40-0	N,N-Diethylhydrazine	0	UC
123-91-1	1,4-Dioxane	100	UA
107-12-0	Ethylcyanide	10	UA
76-13-1	Freon TF	5	UB
50-00-0	Formaldehyde	0	UC
74-88-4	Iodomethane	5	UA
78-83-1	Isobutyl alcohol	100	UA
126-98-7	Methacrylonitrile	25	UA
60-34-4	Methyl hydrazine	0	UC
123-63-7	Paraldehyde	0	UC
76-01-7	Pentachloroethane	5	UB
600-20-6	1,1,1,2-Tetrachloroethane	5	UA
509-14-8	Tetranitromethane	0	UC
75-70-7	Trichloromethanethiol	0	UC
75-69-4	Trichlorofluoromethane	5	UA
598-77-6	1,1,2-Trichloropropane	10	UB
3175-23-3	1,2,2-Trichloropropane	10	UB
96-18-4	1,2,3-Trichloropropane	10	UA

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

TRIP_BLANK

Lab Name: G S E L I Contract: 8931195850
Lab Code: GULF Case No.: GOLDER SAS No.: _____ SDG No.: _____
Matrix: (soil/water) WATER Lab Sample ID: FZM02
Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VDFZM02R
Level: (low/med) LOW Date Received: 03/28/91
% Moisture: not dec. _____ Date Analyzed: 04/09/91
Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0 CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====

PROJECT NO. 893-1195-850 SITE INEL
LABORATORY NATEX SAMPLES/MATRIX _____
SDG # _____
CPR48-1-10 / 50.1
- Trip Blank / Water

	VOA	BNA	PEST	OTHER
1. HOLDING TIMES	0			
2. GC/MS TUNE/INSTR. PERFORM	0			
3. CALIBRATIONS	0			
4. BLANKS	0			
5. SURROGATES	0			
6. MATRIX SPIKE/DUP	0			
7. OTHER QC	0			
8. INTERNAL STANDARDS	0			
9. COMPOUND IDENTIFICATION	0			
10. SYSTEM PERFORMANCE	0			
11. OVERALL ASSESSMENT	0			

X = Problems, but do not affect data.

NOTES:

Reviewed by: _____ Date: _____

Acceptable
YES NO

1. Holding Times ----- ✓ -----
checked C.O.C. and Form I's, samples analyzed
within spec period of time

2. GC/MS Tuning ----- ✓ -----
checked Form I's and raw data, recalc 175/174, all
within spec criteria. All samples analyzed within
approp time period.

3. Calibration ----- ✓ -----
ILRI - checked raw data and Form II, recalc RRFs and %RSDs
CCRI - checked raw data + Form III's, recalc RRFs + %RSD

4. Blanks ----- ✓ -----
pests + texture found in blanks
Trip blank contains texture

5. Surrogate Recovery ----- ✓ -----
checked Form IV's + raw data. All SUR %R
within spec limits

6. Matrix Spike/Matrix Spike Duplicates ----- ✓ -----
MS %R ^{all within} spec limits, all MSD %R + %RPD
within spec limit

7. Field Duplicates -----

SDG #

Project No.

893-1175-850

Acceptable
YES NO

8. Internal Standards Performance

All RT's and areas within spec limits

9. TCI Compound Identification

checked RRTs - all w/in spec limits

10. Compound Quant. and Reported Detection Limits ..

Recalc from raw data to form I's, all ok

11. Tentatively Identified Compounds

No TIC's in this SDG

12. System Performance

No extra peaks or rising baselines, resolution good

13. Overall Assessment

There were no problems associated w/ this data

ORGANIC DATA ASSESSMENT SUMMARY

PROJECT NO. 893-1195, ~~530~~ ⁵³⁰ 850 SITE INEL
LABORATORY GSEL SAMPLES/MATRIX 1 soil
SDG # CPP48-1-10

DATA ASSESSMENT SUMMARY

	VOA	<u>BNA</u>	PLST	OTHER
1. HOLDING TIMES		<u>0</u>		
2. GC/MS TUNE/INSTR. PERFORM		<u>0</u>		
3. CALIBRATIONS		<u>0</u>		
4. BLANKS		<u>0</u>		
5. SURROGATES		<u>0</u>		
6. MATRIX SPIKE/DUP		<u>0</u>		
7. OTHER QC		<u>-</u>		
8. INTERNAL STANDARDS		<u>0</u>		
9. COMPOUND IDENTIFICATION		<u>0</u>		
10. SYSTEM PERFORMANCE		<u>0</u>		
11. OVERALL ASSESSMENT		<u>0</u>		

0 = Data had no problems/or qualified due to minor problems.

M = Data qualified due to major problems.

Z = Data unacceptable.

X = Problems, but do not affect data.

NOTES: _____

Validated by: Dennis K. Robinson Date: 5/8/91
Reviewed by: _____ Date: _____

Acceptable
YES NO1. Holding Times ----- ☒Sample collected 3/24Sample extracted 4/2 7 day HTSample analyzed 4/8 6 day HT2. GC/MS Tuning ----- ☒Recalc. 5/1/98, 275/198 + 442/198 ok ✓3. Calibration ----- ☒In. 7! App 9 ^{12/15/90} OK ✓ SVOA ^{2/26/91} OK ✓ Recalc. RRFs + RRFsCont: App 9 ^{4/08/91} OK ✓ SVOA ^{4/08/91} OK ✓ Recalc RRFs + %D

4. Blanks -----

Peak at scan 333 unaccounted for. > 10% nearest IS. No other Peaks except IS & SS.5. Surrogate Recovery ----- ☒All surrogates within control limits.6. Matrix Spike/Matrix Spike Duplicates ----- ☒MS/MSD analysis ok ✓MS %R for Phenol = ~~93~~ 93 and 2,4-DNT = 98, UCL are 90 + 89 respectivelyRPD for 1,2,4-TCB = 28 and Acenaphthene = 25, LMR = 23 + 19 respectively7. Field Duplicates ----- N/ANo Field Dups

Acceptable
YES NO

8. Internal Standards Performance ----- ✓ -----

IS4, IS5 + IS6 ~~were~~ areas for MS were reported
for MSD and areas for MSD were perported
for MS. All areas and RTs within spec. Control limits

9. TCL Compound Identification ----- ✓ -----

No TCL Compounds detected.

10. Compound Quant. and Reported Detection Limits -- ✓ -----

Reported CRLs on ✓

11. Tentatively Identified Compounds ----- ~~✓~~ -----

Peak at ~ 350 scan not identified or
explained - shows up in blank and samples
would be reported as U due to Blank Cont.

12. System Performance ----- ✓ -----

No discrete shifts in RIC baseline noted
No excessive baseline rise noted, No Peak tailing
No decrease or increase in IS areas

13. Overall Assessment ----- ✓ -----

Data acceptable for use as reported
by the laboratory.

Golder Associates

TELECON/ CONTACT MEMORANDUM

☐ Personal Visit
☒ Telephone: ☐ Incoming ☒ Outgoing

ROUTE TO:

Files

- ☒ Project
☐ Business Development
☐ Mailing List

Company Name: GSELI

Address: _____

Person: Shelley Antone

Telephone: (504) 283-4223

Job/subject: SVON Quant Report

Job No. 893-1195,530

Date: 5/8

Time: 08:15

Remarks:

1000 ng/ul A

100 ul Vol : = 3333

DWF = 1/DWF

500 ng/ul B/N

Surrogate Added:

Acids (100 ul x 1000ng/ul) / 30 g = 3333. ng/g

Base/Neutrals (100 ul x 500 ng/ul) / 30 g = 1667. ng/g

Amount = $\frac{(A_n)(I_s)}{(A_{is})(RRF)}$ • QLF ng/g

Sur. Rec. = $\frac{\text{Amount}}{3333 \text{ or } 1667} \times 100$

Action/Next Contact:

BY: Dennis Roberson

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858 • FAX: 918-251-2599

CLIENT: GOLDER ASSOCIATES, INC.
4104 148TH AVENUE N.E.
REDMOND, WASHINGTON 98052
ATTN: KENT ANGELOS

REPORT: 5529.01DF

DATE: 04-29-91

SAMPLE MATRIX: SOIL
SWLO # 5529.01
METHOD REFERENCE: SW846-8280
DATE SUBMITTED: 03-28-91
DATE EXTRACTED: 04-12-91
DATE ANALYZED: 04-24-91
SAMPLE ID: CPP48-1-10

RESULTS REPORTED IN Parts Per Trillion (ng/Kg)

<u>ANALYTE</u>	<u>EST. DETECTION LIMIT</u>	<u>CONCENTRATION</u>
----------------	---------------------------------	----------------------

DIOXINS

TOTAL TETRA CDD	30.3	ND
TOTAL PENTA CDD	402.0	ND
TOTAL HEXA CDD	1105.2	ND
TOTAL HEPTA CDD	95.7	ND
TOTAL OCTA CDD	636.8	ND

FURANS

TOTAL TETRA CDF	101.1	ND
TOTAL PENTA CDF	270.4	ND
TOTAL HEXA CDF	242.5	ND
TOTAL HEPTA CDF	214.1	ND
TOTAL OCTA CDF	649.3	ND

QA/QC SURROGATE RECOVERIES

13C-TCDD (40-169)	56%	13C-TCDF (40-169)	62%	13C-HxCDD (40-169)	82%
13C-OCDD (40-169)	59%	13C-HpCDF (40-169)	91%		

ND = NOT DETECTED ABOVE QUANTITATION LIMIT

NA = NOT APPLICABLE

J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION

B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE

* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858 • FAX: 918-251-2599

CLIENT: GOLDER ASSOCIATES, INC.
4104 148TH AVENUE N.E.
REDMOND, WASHINGTON 98052
ATTN: KENT ANGELOS

REPORT: 5529a

DATE: 04-29-91

SAMPLE MATRIX: SOIL
SWLO # METHOD BLANK
METHOD REFERENCE: SW846-8280
DATE EXTRACTED: 04-12-91
DATE ANALYZED: 04-24-91
SAMPLE ID: METHOD BLANK

RESULTS REPORTED IN Parts Per Trillion (ng/Kg)

<u>ANALYTE</u>	<u>EST. DETECTION LIMIT</u>	<u>CONCENTRATION</u>
----------------	---------------------------------	----------------------

DIOXINS

TOTAL TETRA CDD	50.1	ND
TOTAL PENTA CDD	323.0	ND
TOTAL HEXA CDD	652.2	ND
TOTAL HEPTA CDD	178.8	ND
TOTAL OCTA CDD	741.7	ND

FURANS

TOTAL TETRA CDF	30.4	ND
TOTAL PENTA CDF	142.2	ND
TOTAL HEXA CDF	275.3	ND
TOTAL HEPTA CDF	220.4	ND
TOTAL OCTA CDF	454.6	ND

QA/QC SURROGATE RECOVERIES

13C-TCDD (40-169) 46%	13C-TCDF (40-169) 57%	13C-HxCDD (40-169) 116%
13C-OCDD (40-169) 64%	13C-HpCDF (40-169) 123%	

ND = NOT DETECTED ABOVE QUANTITATION LIMIT

NA = NOT APPLICABLE

J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION

B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE

* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

ORGANIC DATA ASSESSMENT SUMMARY

PROJECT: 893-1195.850

SITE: LDU-CPP-48

LABORATORY: Southwest
Laboratory

SAMPLES/MATRIX: one soil,
CPP48-1-10

SDG: 5529

COMMENTS: Sample group consisted of one soil sample, no field
QC

DATA ASSESSMENT SUMMARY

REVIEW ITEM	VOA	BNA	PEST	DIOXIN FURANS
1. HOLDING TIMES	N/A	N/A	N/A	O
2. GC/MS TUNE/INSTR. PERF.	N/A	N/A	N/A	O
3. CALIBRATIONS	N/A	N/A	N/A	O
4. BLANKS	N/A	N/A	N/A	O
5. SURROGATES	N/A	N/A	N/A	O
6. MS/MSD	N/A	N/A	N/A	O
7. OTHER QC	N/A	N/A	N/A	N/A
8. INTERNAL STANDARDS	N/A	N/A	N/A	O
9. COMPOUND IDENTIFICATION	N/A	N/A	N/A	O
10. SYSTEM PERFORMANCE	N/A	N/A	N/A	O
11. OVERALL ASSESSMENT	N/A	N/A	N/A	O

O = DATA HAD NO PROBLEMS/OR QUALIFIED DUE TO MINOR PROBLEMS

M = DATA QUALIFIED DUE TO MAJOR PROBLEMS

Z = DATA UNACCEPTABLE

X = PROBLEMS BUT DO NOT AFFECT DATA

NOTES: Detection limits for this batch are slightly elevated
above that which is specified
in the contract.

REVIEWED BY:

Walter M. Angles

DATE:

5/9/91

1. HOLDING TIMES: Samples were collected, 3/26/91 and received at the laboratory 3/28/91, extractions were begun 4/12/91, analysis was completed 4/24/91. All holding times were met. No data requalification is necessary based on holding times.

2. GC/MS TUNING: The laboratory set up the MS control program to acquire SIM data for all the necessary compound ions as specified in EPA Method 8280. Mass acquisition dwell times were set appropriately to acquire the data properly and in accordance with the laboratory approved SOP.

3. CALIBRATION: Initial calibrations were conducted 4/23/91 prior the analysis of samples on 4/24/91. The RSD values for all native and labeled isomers were $\leq 20\%$ and S/N was acceptable. Ion ratios for the initial calibration standards were acceptable except for standard CC2 for PeCDD, CC1 for 1234678-HpCDF, CC1 for OCDD-C13 and CC2 and CC4 for 13C-1234678-HpCDF. No transcription or recalculation errors were noted. No data qualification is necessary based on the initial calibration data since no positive results were reported for the compounds where the chlorine isotope ratios were exceeded.

A window defining mix was analyzed prior to the initial calibration and peak separation between the first and last eluting unlabeled PCDD isomers was acceptable.

A continuing calibration was conducted 4/24/91 prior to the analysis of samples. The percent difference between the mean RRF and the CCAL RRF was $\leq 20\%$, ion ratios were acceptable and S/N was acceptable. No data qualification is necessary based on the continuing calibration data since no > detection limit results were reported.

4. BLANKS: A method blank of similar matrix was extracted and analyzed with the samples. No dioxin/furans were detected. Internal and recovery standard ion ratios were acceptable. Internal standard recoveries ranged from 46 to 123% which is within acceptance limits of 40 to 120%. No data requalification is necessary based on the blank data.

5. SURROGATES: C^{13} labeled PCDD/PCDF compounds were added to all the blanks, blank and samples. Recoveries were within the 40 to 120% limits. No transcription or calculation errors were noted and no data requalification is necessary based on the data.

6. MATRIX SPIKE RECOVERIES: Matrix spikes are only analyzed when specifically requested by GAI. The analyses contained in this data package are for Appendix VIII screening purposes only and MS/MSDs were not necessary.

7. FIELD DUPLICATES: No field duplicates were submitted as part of this case.

8. INTERNAL STANDARDS: ^{13}C labeled PCDD/PCDFs were added to all samples, standards, blanks, spikes and samples. Recoveries were all within 40 to 120% of the true values. Ion ratios were acceptable and retention times were stable from analysis to analysis. No transcription or calculation errors were noted and no data requalification is necessary based on the data.

9. COMPOUND IDENTIFICATION: No PCDD/PCDFs were detected. No data requalification is necessary based on the data.

10. COMPOUND QUANTITATION AND REPORTED DETECTION LIMITS: No transcription errors were noted with the ion ratios, surrogate recoveries, internal standard recoveries or MS/MSD recoveries. Slight differences in detection limit results were obtained when the values were recalculated however due to round-off error. Detection limits did not meet the contract required limits of 0.5 ppb. Reported detection limits ranged from 0.03 to 1.1052 ppb. No data requalification is necessary based on the data.

11. SYSTEM PERFORMANCE/OVERALL ASSESSMENT: Analysis was performed in accordance with method requirements as specified in the approved laboratory QAPP with slightly elevated detection limits. No problems were identified that would require qualification of the data.

12. DATA USE: Data as reported from the laboratory is acceptable for use. Copies of the laboratory reported results and calculations sheets are provided as attachments to this report

ATTACHMENT 1
LABORATORY REPORTS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858 • FAX: 918-251-2599

CLIENT: GOLDER ASSOCIATES, INC.
4104 148TH AVENUE N.E.
REDMOND, WASHINGTON 98052
ATTN: KENT ANGELOS

REPORT: 5529.01DF

DATE: 04-29-91

SAMPLE MATRIX: SOIL
SWLD # 5529.01
METHOD REFERENCE: SW846-8280
DATE SUBMITTED: 03-28-91
DATE EXTRACTED: 04-12-91
DATE ANALYZED: 04-24-91
SAMPLE ID: CPP48-1-10

RESULTS REPORTED IN Parts Per Trillion (ng/Kg)

<u>ANALYTE</u>	<u>EST. DETECTION LIMIT</u>	<u>CONCENTRATION</u>
----------------	---------------------------------	----------------------

DIOXINS

TOTAL TETRA CDD	30.3	ND
TOTAL PENTA CDD	402.0	ND
TOTAL HEXA CDD	1105.2	ND
TOTAL HEPTA CDD	95.7	ND
TOTAL OCTA CDD	636.8	ND

FURANS

TOTAL TETRA CDF	101.1	ND
TOTAL PENTA CDF	270.4	ND
TOTAL HEXA CDF	242.5	ND
TOTAL HEPTA CDF	214.1	ND
TOTAL OCTA CDF	649.3	ND

QA/QC SURROGATE RECOVERIES

13C-TCDD (40-169)	56%	13C-TCDF (40-169)	62%	13C-HxCDD (40-169)	82%
13C-OCDD (40-169)	59%	13C-HpCDF (40-169)	91%		

ND = NOT DETECTED ABOVE QUANTITATION LIMIT

NA = NOT APPLICABLE

J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION

B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE

* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858 • FAX: 918-251-2599

CLIENT: GOLDER ASSOCIATES, INC.
4104 148TH AVENUE N.E.
REDMOND, WASHINGTON 98052
ATTN: KENT ANGELOS

REPORT: 5529a

DATE: 04-29-91

SAMPLE MATRIX: SOIL
SWLO # METHOD BLANK
METHOD REFERENCE: SW846-8280
DATE EXTRACTED: 04-12-91
DATE ANALYZED: 04-24-91
SAMPLE ID: METHOD BLANK

RESULTS REPORTED IN Parts Per Trillion (ng/Kg)

ANALYTE	EST. DETECTION LIMIT	CONCENTRATION
---------	-------------------------	---------------

DIOXINS

TOTAL TETRA CDD	50.1	ND
TOTAL PENTA CDD	323.0	ND
TOTAL HEXA CDD	652.2	ND
TOTAL HEPTA CDD	178.8	ND
TOTAL OCTA CDD	741.7	ND

FURANS

TOTAL TETRA CDF	30.4	ND
TOTAL PENTA CDF	142.2	ND
TOTAL HEXA CDF	275.3	ND
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TOTAL OCTA CDF	454.6	ND

QA/QC SURROGATE RECOVERIES

13C-TCDD (40-169) 46%	13C-TCDF (40-169) 57%	13C-HxCDD (40-169) 116%
13C-OCDD (40-169) 64%	13C-HpCDF (40-169) 123%	

ND = NOT DETECTED ABOVE QUANTITATION LIMIT

NA = NOT APPLICABLE

J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION

B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE

* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

ATTACHMENT 2
CALCULATION WORKSHEETS

1. Holding Times

Sample	Collect Date	Receipt Date	Extract Date	Extract Hold Days	Analysis Date	Analysis Hold Days
<i>CAAS-110</i>	<i>3/26/91</i>	<i>3/27/91</i>	<i>4/12/91</i>	<i>17</i>	<i>4/24/91</i>	<i>12</i>

Samples were extracted and analyzed within the recommended holding time as specified in EPA Method 8290 (30 days).

2. Calibrations

The window defining mix was analyzed prior to calibration and peak resolution for the TCDD isomers was acceptable.

RRF Recheck for 2378-TCDD

$$\text{Formula} = \text{RRF} = \frac{A_n \times Q_{is}}{A_{is} \times Q_n}$$

Standard	A_n	Q_{is}	A_{is}	Q_n	RRF Calc.	RRF Report
CC.1	7044	0.5	33881	0.1	1.03952	1.03952
CC.2	18547	0.5	35703	0.25	1.03896	1.03896
CC3	36605 36605	0.5	30000	0.50	1.22017	1.22017
CC4	71252	0.5	31495	1.0	1.13116	1.13116
CC5	146475	0.5	32888	2.0	1.11344	1.11344

**Golder
Associates**

SUBJECT <i>Case 5529, SUL Dioxin/Furan</i>		
Job No. <i>8931195</i>	Made by <i>WMA</i>	Date <i>5/8/91</i>
Ref.	Checked	Sheet <i>2</i> of <i>3</i>
Reviewed		

2. Calibrations, cont'd.

RSD recheck from previous page

$$RSD_{calc} = 6.78 \quad RSD_{rpt} = 6.780$$

Ion ratios check for ^{13}C -2378-TCDD

Std	Ared \bar{A}_I	Area \bar{A}_I	Ratio Calc	Ratio rpt	Limits 0.65-0.89
-----	---------------------	---------------------	---------------	--------------	---------------------

CC1	32970	29995	0.883	.513	OK
CC2	35573	30945	0.870	.570	↓
CC3	30000	24458	0.815	.815	
CC4	31492	26129	0.830	.830	
CC5	32874	27083	0.825	.825	

Continuing calibration check

	A_n	Q_{is}	A_{is}	Q_n	RRF Calc	RRF Report
CC3 2378-TCDD	43091	0.5	234598	0.5	1.25272	1.25272

~~ratio = 34398 / 25446 = 1.35~~

ratio = $25446 / 34398 = 0.74$ ✓
for 2378-TCDD LIS

3. Blank

Matrix blank analyzed, no detectable
materials.

4. Surrogates

Surrogate acceptable, recalc checked
for sample & blank.

	<i>Asst. Eval</i>	<i>Asst. Add</i>	<i>%R</i>	<i>%R</i>
13C-TCDD	0.28	0.5	56	56
13C-TCDF	0.31	0.5	62	62
13C-HxCDD	0.41	0.5	82	82
13C-OCDD	0.59	1.0	59	59
13C-HpCDF	0.91	1.0	91	91

Recalc check for 13C-TCDD

$$100X \frac{17946 \times 0.5}{35337 \times 0.89497 \times 0.5} = 57$$

5. Detection limits

$$TCDD = \frac{91 \times 2.5 \times 50000}{17946 \times 1.255 \times 10} = 50.6$$

reported value lower @ 30.3
due to round off error

INORGANIC DATA ASSESSMENT SUMMARY

PROJECT NO. 893-1195. SITE IWEL
LABORATORY GSEL SAMPLES/MATRIX 1.50/1
SDG # CPP48-1-10

DATA ASSESSMENT SUMMARY

	ICP	AA	HG	CYANIDE
1. HOLDING TIMES	<u>0</u>	<u>0</u>	<u>0</u>	
2. CALIBRATIONS	<u>M</u>	<u>0</u>	<u>0</u>	
3. BLANKS	<u>0</u>	<u>0</u>	<u>0</u>	
4. ICS	<u>0</u>			
5. LCS	<u>0</u>	<u>0</u>	<u>0</u>	
6. DUPLICATE ANALYSIS	<u>0</u>	<u>0</u>	<u>0</u>	
7. MATRIX SPIKE	<u>0</u>	<u>0</u>	<u>0</u>	
8. MSA		<u>N/A</u>		
9. SERIAL DILUTION	<u>0</u>			
10. SAMPLE VERIFICATION	<u>0</u>	<u>0</u>	<u>0</u>	
11. OTHER QC	<u>0</u>	<u>0</u>	<u>0</u>	
12. OVERALL ASSESSMENT	<u>0</u>	<u>0</u>	<u>0</u>	

0 = Data had no problems/or qualified due to minor problems.

M = Data qualified due to major problems.

Z = Data unacceptable.

X = Problems, but do not affect data.

NOTES: Data as qualified are acceptable
for use.

Validated by: _____ Date: _____

Reviewed by: _____ Date: _____

SDG # CPP48-1-10 Project No. 893-1195.530

Acceptable
YES NO

8. Furnace Atomic Absorption QC -----

Add Spike for PBS As = 130.1% R
~~Do not~~ samples during Se anal. had 90% RSD of dup. Inj.
> 20% samples weren't rerun (F2M-01D)

9. ICP Serial Dilution ----- ✓

Cu - %D = 20.7 Quality as "J"

10. Sample Result Verification ----- ✓

Sample results recalculated and verified.

11. Field Duplicates ----- N/A

12. Overall Assessment ----- ✓

Data ~~are~~ qualified are acceptable
for use

INORGANIC DATA ASSESSMENT SUMMARY

PROJECT NO. 893-1195.850 SITE INEL
 LABORATORY ASELI SAMPLES/MATRIX 1 SOI.7
 SDG # CPP48-1-10

DATA ASSESSMENT SUMMARY

Conventional Parameters

	ICP	AA	HG	CYANIDE
1. HOLDING TIMES				0
2. CALIBRATIONS				0
3. BLANKS				0
4. ICS				
5. LCS				N/A
6. DUPLICATE ANALYSIS				0
7. MATRIX SPIKE				0
8. MSA				
9. SERIAL DILUTION				
10. SAMPLE VERIFICATION				0
11. OTHER QC				N/A
12. OVERALL ASSESSMENT				0

0 = Data had no problems/or qualified due to minor problems.

M = Data qualified due to major problems.

Z = Data unacceptable.

X = Problems, but do not affect data.

NOTES: Data are acceptable as reported
by the laboratory.

Validated by: Dennis R. [Signature] Date: 5/31/91

Reviewed by: _____ Date: _____

SDG # CPP48-1-10Project No. 843-1195.850Acceptable
YES NO

1. Holding Times ----- ✓

Sample Collected: 3/26/91 Sulfide Anal: 4/2/91 7 days OK ✓

Sulfate: 4/10/91 - 15 days OK ✓ Phenols: 4/5/91 10 days OK ✓ $\text{NO}_3\text{-NO}_2$:13 days OK ✓ Fluoride: 4/10/91 15 days OK ✓ CN^- : 4/10/91 15 days OK ✓

2. Calibrations ----- ✓

Sulfide: $R = 0.9991$ ICV OK ✓ Sulfate: $r = 0.9995$ ICV OK ✓Phenols: $r = 0.9997$ ICV OK ✓ Nitrate-Nitrite: $r = 0.9981$ ICV OK ✓ F^- : $r = 0.9994$ ICV OK ✓ CN^- : $r = 0.998$ ICV OK ✓ Cl^- : OK ✓

3. Blanks ----- ✓

Sulfide: OK ✓ Sulfate: OK ✓ Phenols: OK ✓

 $\text{NO}_3\text{-NO}_2$: OK ✓ F^- : OK ✓ Cl^- : OK ✓

No Contaminants in Blanks

4. ICP Interference Check Sample (ICS) ----- N/A

5. Laboratory Control Sample (LCS) ----- N/A

6. Duplicate Sample Analysis ----- ✓

Sulfide: RPD = 2% OK ✓ Sulfate: RPD = 25% OK ✓

Phenols: Both ND. $\text{NO}_3\text{-NO}_2$: OK ✓ F^- : No Dup. CN^- : Both ND. Cl^- : RPD = 28% OK ✓

7. Matrix Spike Sample Analysis ----- ✓

Sulfide: %R = 46.6% possible low bias, ~~35%~~Sulfate: No Spike Phenols: 98.3% R OK ✓ $\text{NO}_3\text{-NO}_2$: 105% R OK ✓ F^- : No Spike CN^- : 146% R OK ✓ Cl^- : %R = 93.6

Sample ND.

SDG # CPP45-1-10Project No. 843-1195, 850Acceptable
YES NO

8. Furnace Atomic Absorption QC -----

N/A

9. ICP Serial Dilution -----

N/A

10. Sample Result Verification -----

✓Sulfide: Quant. correct. Sulfate: Quant Correct.Phenols: Quant Correct. NO₂-NO₂: Quant Correct.CN⁻: Quant Correct. Cl⁻: Quant Correct

11. Field Duplicates -----

N/ANo Field Duplicate submitted.

12. Overall Assessment -----

✓Sulfide: Data acceptable as qualified, reportedSulfate: Data acceptable as reportedPhenols: Data acceptable as reported.Nitrate-Nitrate: Data acceptable as reported.Fluoride: Data acceptable as reported.Cyanide: Data acceptable as reported.Chloride: Data acceptable as reported.

ORGANIC DATA ASSESSMENT SUMMARY

PROJECT NO. 893-1195.850 SITE INEL
 LABORATORY ASEI SAMPLES/MATRIX 1 Soil

SDG # CPP48-1-10

DATA ASSESSMENT SUMMARY

	VOA	BNA	<i>Organochlorine</i> PLST <i>PCB</i>	OTHER
1. HOLDING TIMES			<u>0</u>	
2. GC/MS TUNE/INSTR. PERFORM				
3. CALIBRATIONS			<u>0</u>	
4. BLANKS			<u>0</u>	
5. SURROGATES			<u>0</u>	
6. MATRIX SPIKE/DUP			<u>0</u>	
7. OTHER QC			<u>N/A</u>	
8. INTERNAL STANDARDS			<u>N/A</u>	
9. COMPOUND IDENTIFICATION			<u>0</u>	
10. SYSTEM PERFORMANCE			<u>0</u>	
11. OVERALL ASSESSMENT			<u>0</u>	

0 = Data had no problems/or qualified due to minor problems.

M = Data qualified due to major problems.

Z = Data unacceptable.

X = Problems, but do not affect data.

NOTES:

Data as reported by the laboratory
are acceptable for use.

Validated by: _____ Date: _____

Reviewed by: _____ Date: _____

Acceptable
YES NO

1. Holding Times -----

✓

Sample collected: 3/26/91

Sample extracted: 4/2/91

7 day AT

Sample Analyzed: 4/10/91

8 day

2. GC/MS Tuning Instrument Performance -----

3. Calibration -----

✓

Initial: No Trans. or calc. errors noted, recalc. %RSD
for aldrin, endrin, DBC, DDT - No ATs %RSD OK ✓
Continuing: Recalc. %D OK ✓ all slts anal. w/in 72 hr

4. Blanks -----

✓

Field Blank: NONE Submitted Lab Blank: No
contaminants present in the blank.

5. Surrogate Recovery -----

✓

Surrogate Recovery low for prep blank
sample, all other sample surrogate %R
in control OK ✓

6. Matrix Spike/Matrix Spike Duplicates -----

✓

All %R and %RSD within control limits
recalculated %R & %RSD. Found 2 %R
miscalculations; all others correct.

7. Field Duplicates -----

N/A

None Submitted

SDG #

CPP48-1-10

Project No.

843-195,850

Acceptable
YES NO

8. Internal Standards Performance -----

N/A

9. TCL Compound Identification -----

✓

No Target compounds detected in samples.

10. Compound Quant. and Reported Detection Limits --

✓

Reported detection limits confirmed.

11. Tentatively Identified Compounds -----

N/A

12. System Performance -----

✓

No system problems noted

13. Overall Assessment -----

✓

Data as reported by the laboratory
acceptable for use

ORGANIC DATA ASSESSMENT SUMMARY

PROJECT NO. 893-1195.850 SITE INEL
LABORATORY GSEL SAMPLES/MATRIX 1 soil

SDG # OPP48-1-10

DATA ASSESSMENT SUMMARY

	VOA	BNA	<u>Organophosphate</u> PEST	OTHER
1. HOLDING TIMES			0	
2. GC/MS TUNE/INSTR. PERFORM			N/A	
3. CALIBRATIONS			0	
4. BLANKS			0	
5. SURROGATES			0	
6. MATRIX SPIKE/DUP			0	
7. OTHER QC			0	
8. INTERNAL STANDARDS			N/A	
9. COMPOUND IDENTIFICATION			N/A	
10. SYSTEM PERFORMANCE			0	
11. OVERALL ASSESSMENT			0	

0 = Data had no problems/or qualified due to minor problems.

M = Data qualified due to major problems.

Z = Data unacceptable.

X = Problems, but do not affect data.

NOTES:

Data as reported by the laboratory
are acceptable for use.

Validated by:

Dennis K. Brown

Date:

5/24/91

Reviewed by:

Date:

Acceptable
YES NO1. Holding Times ----- ✓Samples Collected : 3/26/91(HT)Sample extracted : 4/1/916 days ✓Sample Analyzed : 4/9/918 days ✓2. ~~GC/MS~~ Instrument Performance -----3. Calibration ----- ✓Initial - RFs recalculated OK ~ %RSDs recalculated OK ✓
Continuing - RF %D recalculated OK ✓4. Blanks ----- ✓No Field Blanks submitted. Laboratory blanks
showed no contamination. OK ✓5. Surrogate Recovery ----- ✓Surrogate % Recovery recalculated - no calc
errors all % Recovery within advised control
limits6. Matrix Spike/Matrix Spike Duplicates ----- ✓Recalculated %R for MS/MSD OK ✓
%RPD for MS/MSD all OK ✓7. Field Duplicates ----- N/ANone Submitted

SDG # CPP49-1-10 Project No. 893-1195,850

Acceptable
YES NO

8. Internal Standards Performance ----- N/A

9. TCL Compound Identification ----- ✓

None detected.

10. Compound Quant. and Reported Detection Limits -- ✓

Recalculated Reported Detection Limits
No Errors Found

11. Tentatively Identified Compounds ----- N/A

None Detected

12. System Performance ----- ✓

No Problems with the system were
noted.

13. Overall Assessment ----- ✓

Data as reported by the
laboratory is acceptable for use.

ORGANIC DATA ASSESSMENT SUMMARY

PROJECT NO. 8931195- SITE COP 48
 LABORATORY GSEL SAMPLES/MATRIX COP48-1-10, MS, MSD
 SDG # FM

DATA ASSESSMENT SUMMARY

	VOA	BNA	PEST	OTHER HERBICIDES
1. HOLDING TIMES				
2. GC/MS TUNE/INSTR. PERFORM				0
3. CALIBRATIONS				0
4. BLANKS				0
5. SURROGATES				0
6. MATRIX SPIKE/DUP				0
7. OTHER QC				N/A
8. INTERNAL STANDARDS				g N/A
9. COMPOUND IDENTIFICATION				0
10. SYSTEM PERFORMANCE				0
11. OVERALL ASSESSMENT				0

0 = Data had no problems/or qualified due to minor problems.
 M = Data qualified due to major problems.
 Z = Data unacceptable.
 X = Problems, but do not affect data.

NOTES: _____

Validated by: Christina Jensen Date: 5/9/91
 Reviewed by: _____ Date: _____

SDG #

FEM

Project No.

8931195850

Acceptable
YES NO

1. Holding Times -----

Date Sampled: 3/26/91

Date Extracted: 4/1/91

Date Analyzed: 4/5/91

2. ~~GC/MS~~ Tuning Initial Calibration -----

Initial cal: All % RSD were < 20, RF recalculated for DCPA surrogate with value correctly reported. Spiked herb cal. done. Checked RTs. RF checked OK ^{area}/_{conc} used for % RSD.

3. Calibration -----

Widebore RT% < 1.5 Checked raw data against form 6. Chromatograms reviewed - no baseline rise, peaks resolved. CCAI RTs within established ^{100%}/_{100%} windows. Correlation was < .995 (.9793 - .9896) ✓

4. Blanks -----

Chromatogram reviewed for peaks. All compounds were below detection for blank.

5. Surrogate Recovery ^{5/1/91} Retention Time Shift -----

Surrog. added to all sples + blanks. Used DCPA & 2,4-DB all RSDs < 20%, recalculated RSDs OK. RT% were .75 to 1.50.

6. Matrix Spike/Matrix Spike Duplicates -----

Blank Spike performed on blank, ms, msp done on sample. Methylation performed on blank. OK. Recoveries recalculated from raw data, RPDs recalc.

7. Field Duplicates -----

no field duplicates collected N/A

SDG # FZM Project No. 8937195, 850

Acceptable
YES NO

8. Internal Standards Performance -----

N/A

9. TCL Compound Identification ----- ✓

Compared RTs of target compounds with raw data to confirm non-detects. Detected at 1. 9 ppb ^{ug/l}, contacted lab for calculation to ^{ug/kg} reported

10. Compound Quant. and Reported Detection Limits -- ✓

DL's stated in OAPP were

24D	330
SILVER	200
245T	200

 Goals for this analysis were met. Compound quant was checked and recalculated from raw data.

11. Tentatively Identified Compounds -----

N/A

12. System Performance ----- ✓

Chromatograms reviewed with a few small peaks detected below the reporting limit of 1 ug/kg

13. Overall Assessment ----- ✓

R Squared was $\sim .995$, however, Hubs II are usually a little difficult to run. R Squared ranged from .9793 to .9896

APPENDIX F
1986 Drilling and Sampling Analytical Data



Idaho National Engineering Laboratory

001620

FAH-11-86
From F. A. Hohorst
Phone 6-4542/ILF-107
Date August 22, 1986
Subject Analytical Data and QA/QC Results, CPP-1608

To G. J. McManus, Supervisor
Monitoring Technology

- References:
1. US EPA, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, 2nd Edition", SW-846 (1982 et ff).
 2. D.S. Barth and B.J. Mason, Soil Sampling Quality Assurance User's Guide, EPA-600/4-84-043 (March 1984).
 3. US EPA, Contract Laboratory Program, Statement of Work, SOW No. 735 (July 1985).
 4. National Bureau of Standards, Handbook for SRM Users, NBS Special Publication 260-100 (September 1985).

cc: S. J. Fernandez *47* D. J. Poland
J. D. Folkner B. R. Wheeler
A. J. Matule F. A. Hohorst-2
B. G. Motes *BGM*

In February and March, subsurface soil samples were taken from twenty-four holes at the proposed location of CPP-1608, south of CPP-633. The sampling grid was laid out by D.J. Poland. Ms. Poland should be consulted for a description of the sampling locations, methods of sample collection, and sample drilling log data. The relative locations of these sample holes are shown in Figure 1. Ms. Poland also selected samples for analysis by Analytical Chemistry using US EPA methods in Reference 1. I prepared these selected samples and a limited number of duplicates and blanks for analysis. Physical descriptions and analytical results are presented in Tables 1 and 2.

Based on these data, my evaluation of the samples and the QA/QC aspects of this work using Reference 2 and 3 as guides is as follows:



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1. OBSERVED CONCENTRATIONS. Most results were reported as "less than values". The maximum observed concentration for each specie is tabulated in Table 3 along with a comparison to the limit in Method 1310. The most significant specie is lead at an observed value of 1.16 mg l⁻¹.
2. DUPLICATE ANALYSES. Because reportable detection limits were raised far above anticipated levels for such analyses (Cf. Reference 3), no evaluation of duplicate analyses of samples for arsenic, cadmium, chromium, lead, selenium, or silver is possible. I have examined results of duplicate samples of several other species reported in Table 3. The coefficient of variance (CV) within these sets of data appear acceptable. That the greatest value of CV for anions was for measurements of very low levels of fluoride is expected.
3. SPIKED SAMPLE RECOVERIES. Anticipated recoveries of the eight elements reported herein are 75-125% (Reference 2). In the case of mercury, limited data on recoveries of single element spikes ranged from <45% to 82%. These data indicate that our analytical procedures may not be in statistical control (Cf. Reference 4). The potential causes of these low recoveries are that either 1) the substrate retains cations (like a cation exchange resin) thus lowering anticipated recoveries, or 2) the techniques for these types of analyses need further refinement. Further work on the task is recommended before future analyses are performed.
4. MULTI-ELEMENT SPIKED SAMPLE RECOVERIES. Table 4 reports recoveries of the most concentrated multi-element spikes from soils having a similar composition taken at the proposed site of the FPR Warehouse. Data for sample 23-SE could not be evaluated regarding lead because the matrix blank exceeded the spiked sample value. The other two samples show recoveries of lead at locations 35-NW and 53-NW of 9.6% and 23%, respectively.
5. SAMPLE BLANKS. The analyses of blank samples reported in Table 6 show reasonable agreement. However, since recovery data is very limited, it is not conclusive that they are within appropriate guidelines.

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6. OTHER ASPECTS OF QC. A limited number of split extracts and re-extractions and have shown satisfactory results. With regard to other aspects of QC, I have received verbal confirmation that analyses of reagent blanks, calibration check standards, and spiked extracts have been satisfactory. Confirming documentation was sent to D.J. Poland.

The most significant specie was lead at Hole #3. Its level was 1.16 mg l⁻¹, or 23.2% of the maximum concentration permitted in EPA Method 1310. Because experimental recoveries of only 9.6 and 23% for spiked lead samples were realized, the method may not be statistical control.

Before a definitive conclusion can be reached, the reason for lower than expected recoveries, based on Reference 3, of several species must be determined. One interpretation of the low spike recoveries is that the analytical procedures are not in statistical control. Another explanation is that species are held so tightly that no transport occurs, i.e., in our soil whatever has been released is still there and, if so, the history of this location should be examined.

If you have any questions or require explicit details, please let me know.



Frederick A. Hohorst
Monitoring Technology

/kc

Attachment

G. J. McManus
Attachment
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Table I

Characteristics and Anionic Species Observed at the CPP-1608 Site

(Units of all species except pH are milligrams per liter of extract.)

<u>Sample</u>	<u>Depth</u> ^a	<u>pH</u>	<u>F⁻</u>	<u>NO₃⁻</u>	<u>SO₄⁻</u>	<u>Comments</u>
1-1	8	8.47	0.25	<0.65	3.35	Hole 1 is a procedure blank drilled near the production wells north of CPP-674.
1-2	18	9.44	0.45	<0.65	3.30	
1-3	33	8.81	0.35	0.65	0.65	
1-4	43	8.18	0.50	<0.65	0.65	
2-1 ^b	8	9.00	0.35	<0.75	<1.60	
2-2 ^b	18	9.11	0.55	<0.80	1.20	
2-3 ^b	28	8.62	0.70	2.00	1.00	
2-4 ^b	38	7.82	0.15	1.15	3.40	
3-1 ^b	8	9.30	---	---	---	
3-2 ^b	26	8.96	---	---	---	
3-3 ^b	40	7.99	0.20	3.27	<0.75	
4-1	8	9.18	0.55	<0.80	3.08	
4-3	26	8.40	0.20	12.44	1.54	
5-3	43	9.02	0.15	<0.80	<0.70	
6-1	13	9.01	0.20	0.88	2.77	
6-2	23	8.89	0.20	4.68	2.50	
6-2D	23	8.71	0.20	5.32	3.21	
6-3	43	9.06	0.15	<0.80	<0.70	
7-1	13	8.43	---	---	---	
7-2	23	8.68	---	---	---	
7-3	43	9.04	0.2	<0.80	<0.71	
7-3D	43	8.96	---	---	---	

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Table I (Continued)

Characteristics and Anionic Species Observed at the CPP-1608 Site

(Units of all species except pH are milligrams per liter of extract.)

<u>Sample</u>	<u>Depth^a</u>	<u>pH</u>	<u>F⁻</u>	<u>NO₃⁻</u>	<u>SO₄⁻</u>	<u>Comments</u>
8-1	23	8.60	---	---	---	
8-2	33	8.27	0.5	19.2	<0.71	
9-1 ^b	18	9.14	---	---	---	
9-1D ^b	18	9.08	---	---	---	
9-2 ^b	28	8.53	0.6	6.13	<0.71	
9-2D ^b	28	8.42	<0.1	5.59	<0.79	
10-1	18	9.14	---	---	---	
10-2	28	8.41	0.25	2.74	1.1	
11-2	33	8.18	0.25	17.0	0.93	
12-2	33	7.15	0.15	20.2	0.63	
12-2D	33	*	0.15	19.8	0.74	* pH range was 7.8 to 8.5.
13-2	33	8.17	0.20	13.3	1.7	
14-1	18	8.96	0.40	2.10	2.80	
14-1	18	6.52	0.30	2.6	2.80	
14-2	28	6.55	---	---	---	
15-1 ^b	13	8.28	0.40	1.40	2.85	
15-2 ^b	23	8.08	---	---	---	
16-1	13	7.82	0.45	42.5	2.00	
16-2	23	8.17	---	---	---	
17-1	13	8.65	0.55	<0.80	2.53	
18-1	18	8.56	0.30	<0.80	1.55	
19-1	18	9.09	0.35	<0.80	1.43	
20-1	13	8.53	0.30	10.8	2.90	

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Table I (Continued)

Characteristics and Anionic Species Observed at the CPP-1608 Site
(Units of all species except pH are milligrams per liter of extract.)

<u>Sample</u>	<u>Depth</u> ^a	<u>pH</u>	<u>F</u> ⁻	<u>NO₃</u> ⁻	<u>SO₄</u> ⁻	<u>Comments</u>
21-1	13	7.40	0.25	43.0	2.55	
21-1D	13	6.96	0.19	40.8	29.2	
21-2	23	8.14	---	---	---	
21-2D	23	7.96	---	---	---	
22-1	8	8.03	0.45	5.00	3.30	
22-2	18	7.26	---	---	---	
23-1	8	8.33	0.50	<0.80	3.30	
23-1D	8	8.42	---	---	---	
24-1	8	8.98	0.35	<0.80	1.90	
24-1D	8	9.12	0.25	<0.7	1.6	
25-1	13	8.45	0.30	<0.80	1.25	
26-1	0	8.15	0.15	<0.7	2.9	Hole 26 is a procedure blank drilled near the production wells north of CPP-674.
26-2	8	9.49	0.45	<0.7	2.7	
26-3	13	8.99	0.15	<0.7	<0.6	
26-4	28	8.85	0.10	<0.7	<0.6	

^a Depth in feet below the top of the Excess Chemical Dump Tank, where a two foot long core was taken. Elevation at the top is approximately 4915 feet above sea level.

^b Samples directly under the location of the proposed building.

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Table I (Continued)

Characteristics and Anionic Species Observed at the CPP-1608 Site

(Units of all species except pH are milligrams per liter of extract.)

<u>Sample</u>	<u>Depth^a</u>	<u>pH</u>	<u>F⁻</u>	<u>NO₃⁻</u>	<u>SO₄⁻</u>	<u>Comments</u>
21-1	13	7.40	0.25	43.0	2.55	
21-1D	13	6.96	0.19	40.8	29.2	
21-2	23	8.14	---	---	---	
21-2D	23	7.96	---	---	---	
22-1	8	8.03	0.45	5.00	3.30	
22-2	18	7.26	---	---	---	
23-1	8	8.33	0.50	<0.80	3.30	
23-1D	8	8.42	---	---	---	
24-1	8	8.98	0.35	<0.80	1.90	
24-1D	8	9.12	0.25	<0.7	1.6	
25-1	13	8.45	0.30	<0.80	1.25	
26-1	0	8.15	0.15	<0.7	2.9	Hole 26 is a procedure blank drilled near the production wells north of CPP-674.
26-2	8	9.49	0.45	<0.7	2.7	
26-3	18	8.99	0.15	<0.7	<0.6	
26-4	28	8.85	0.10	<0.7	<0.6	

^a Depth in feet below the top of the Excess Chemical Dump Tank, where a two foot long core was taken. Elevation at the top is approximately 4915 feet above sea level.

^b Samples directly under the location of the proposed building.

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Table II

Metallic Species Observed at the CPP-1608 Site

(Units for all species are milligrams per liter of extract.)

<u>Sample</u>	<u>As</u>	<u>Ba</u>	<u>Cd</u>	<u>Cr</u>	<u>Pb</u>	<u>Hg</u>	<u>Se</u>	<u>Ag</u>
1-1	<0.23	1.12	<0.02	<0.017	<0.40	<0.0001	<0.002	<0.011
1-2	<0.23	0.97	<0.02	<0.017	<0.40	<0.0001	<0.002	<0.011
1-3	<0.23	0.59	<0.02	<0.017	<0.40	<0.0001	<0.002	<0.011
1-4	<0.23	0.51	<0.02	<0.017	<0.40	<0.0001	<0.002	<0.011
2-1 ^a	<0.23	0.64	<0.02	<0.017	<0.40	<0.0001	<0.002	<0.011
2-2 ^a	<0.23	0.43	<0.02	<0.017	<0.40	<0.0001	<0.002	<0.011
2-3 ^a	<0.23	0.59	<0.02	<0.017	<0.40	<0.0001	<0.002	<0.011
2-4 ^a	<0.23	1.60	<0.02	<0.017	<0.40	<0.0001	<0.002	<0.011
3-1 ^a	<0.66	0.93	<0.049	<0.049	1.16	<0.04	<0.002	<0.044
3-2 ^a	<0.66	0.26	<0.049	<0.049	<0.93	<0.04	<0.002	<0.044
3-3 ^a	<0.23	0.31	<0.02	<0.017	<0.40	<0.0001	<0.002	<0.011
4-1	<0.23	1.10	<0.02	<0.017	<0.40	<0.0001	<0.002	<0.011
4-3	<0.23	0.97	<0.02	<0.017	<0.40	<0.0001	<0.002	<0.011
5-3	<0.23	0.52	<0.02	<0.017	<0.40	<0.0001	<0.002	<0.011
6-1	<0.23	1.10	<0.02	<0.017	<0.40	<0.0001	<0.002	<0.011
6-2	<0.23	1.10	<0.02	<0.017	<0.40	<0.0001	<0.002	<0.011
6-2D	<0.53	0.77	<0.007	<0.0085	<0.14	<0.030	<0.002	<0.0055
6-3	<0.23	0.47	<0.02	<0.017	<0.40	<0.0001	<0.002	<0.011
7-1	<0.66	0.88	<0.049	<0.049	<0.93	<0.04	<0.002	<0.044
7-2	<0.66	0.68	0.052	<0.049	<0.93	<0.04	<0.002	<0.044
7-3	<0.53	0.70	<0.005	<0.005	<0.10	<0.0001	<0.002	<0.005
7-3D	<0.66	0.61	<0.049	<0.049	<0.93	<0.04	<0.002	<0.044
8-1	<0.66	1.22	<0.049	<0.049	<0.93	<0.04	<0.002	<0.044
8-2	<0.53	0.41	0.010	<0.005	<0.10	<0.0001	<0.002	<0.005

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Table II (Continued)

Metallic Species Observed at the CPP-1608 Site

(Units for all species are milligrams per liter of extract.)

<u>Sample</u>	<u>As</u>	<u>Ba</u>	<u>Cd</u>	<u>Cr</u>	<u>Pb</u>	<u>Hg</u>	<u>Se</u>	<u>Ag</u>
9-1 ^a	<0.66	0.85	<0.049	<0.049	<0.93	<0.04	<0.002	<0.044
9-1D ^a	<0.66	0.88	<0.49	<0.049	<0.93	<0.04	<0.002	<0.044
9-2 ^a	<0.53	0.49	<0.005	<0.005	<0.10	<0.0001	<0.002	<0.005
9-2D ^a	<0.53	0.086	<0.007	<0.0085	<0.14	<0.030	<0.002	<0.0055
10-1	<0.66	0.74	<0.049	<0.049	<0.93	<0.04	<0.002	<0.044
10-2	<0.53	0.50	0.007	<0.0085	<0.14	<0.0001	<0.002	<0.0055
11-2	<0.53	0.36	0.007	<0.0085	<0.14	<0.0001	<0.002	<0.0055
12-2	<0.53	0.17	0.007	<0.0085	<0.14	<0.0001	<0.002	<0.0055
12-2D	<0.53	0.16	0.007	<0.0085	<0.14	<0.04	<0.002	<0.0055
13-2	<0.53	0.70	0.007	<0.0085	<0.14	<0.0001	<0.002	<0.0055
14-1	<0.53	0.96	<0.005	<0.005	<0.10	<0.0001	<0.002	<0.005
14-1D	<0.53	0.95	0.0090	<0.0085	<0.14	<0.04	<0.002	<0.0055
14-2	<0.66	0.47	<0.049	<0.049	<0.93	<0.04	<0.002	<0.044
15-1 ^a	<0.53	0.77	<0.005	0.016	<0.10	<0.0001	<0.002	<0.005
15-2 ^a	<0.66	0.38	<0.049	<0.049	<0.93	<0.04	<0.002	<0.044
16-1	<0.53	0.59	<0.005	0.017	<0.10	<0.0001	<0.002	<0.005
16-2	<0.66	0.41	<0.049	<0.049	<0.93	<0.04	<0.002	<0.044
17-1	<0.53	1.34	<0.005	0.025	<0.10	<0.0001	<0.002	<0.005
18-1	<0.53	1.05	<0.005	0.019	<0.10	<0.0001	<0.002	<0.005
19-1	<0.53	1.07	<0.0084	0.015	<0.10	<0.0001	<0.002	<0.005
20-1	<0.53	0.87	0.007	<0.0085	<0.14	<0.0001	<0.002	<0.0055
21-1	<0.53	0.45	0.007	<0.021	<0.14	<0.0001	<0.002	<0.0055
21-1D	<0.53	0.23	0.007	<0.085	<0.14	<0.030	<0.002	<0.0055
21-2	<0.66	0.23	<0.049	<0.049	<0.93	<0.04	<0.002	<0.044
21-2D	<0.66	0.13	<0.049	<0.049	<0.93	<0.04	<0.002	<0.044

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Table II (Continued)

Metallic Species Observed at the CPP-1608 Site

(Units for all species are milligrams per liter of extract.)

<u>Sample</u>	<u>As</u>	<u>Ba</u>	<u>Cd</u>	<u>Cr</u>	<u>Pb</u>	<u>Hg</u>	<u>Se</u>	<u>Ag</u>
22-1	<0.53	0.76	0.007	<0.0085	<0.14	<0.0001	<0.002	<0.0055
22-2	<0.66	1.11	<0.049	<0.049	<0.93	<0.04	<0.002	<0.044
23-1	<0.53	1.5	0.007	<0.0085	<0.14	<0.0001	<0.002	<0.0055
23-1D	<0.66	1.54	<0.049	<0.049	<0.93	<0.04	<0.002	<0.044
24-1	<0.53	0.56	0.007	<0.0085	<0.14	<0.0001	<0.002	<0.0055
24-1D	<0.53	0.64	0.007	<0.0085	<0.14	<0.04	<0.002	<0.0055
25-1	<0.53	0.36	0.007	<0.042	<0.14	<0.0001	<0.002	<0.0055
26-1	<0.53	1.3	0.007	<0.0085	<0.14	<0.04	<0.002	<0.0055
26-2	<0.53	1.6	0.007	<0.0085	<0.14	<0.04	<0.002	<0.0055
26-3	<0.53	0.45	0.007	<0.0085	<0.14	<0.04	<0.002	<0.0055
26-4	<0.53	0.10	0.007	<0.0085	<0.14	<0.04	<0.002	<0.0055

^a Samples directly under the location of the proposed building.

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Table III
Comparison of Observed Values with Method 1310 Limits

<u>Species</u>	<u>Maximum Observed (mg l⁻¹)^a</u>	<u>Method Limit (mg l⁻¹)^a</u>	<u>Percent of Limit (%)</u>
pH	9.44	None	---
Fluoride (F)	0.70	None	---
Nitrate (NO ₃)	43.0	None	---
Sulfate (SO ₄)	29.2	None	---
Arsenic (As)	<0.66	5.0	<13.
Barium (Ba)	1.60	100.0	1.6
Cadmium (Cd)	<0.052	1.0	<5.2
Chromium (Cr)	0.049	5.0	1.0
Lead (Pb)	1.16	5.0	23.
Mercury (Hg)	<0.04	0.2	<20.
Selenium (Se)	<0.002	1.0	<0.2
Silver (Ag)	<0.044	5.0	<0.9

^a Method 1310, milligrams per liter of extract,
except pH.

G. J. McManus
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Table IV
Recovery of Single Specie Spikes

<u>Matrix</u>	<u>Specie Spiked</u>	<u>Expected Increase (mg l⁻¹)</u>	<u>Observed Increase (mg l⁻¹)</u>	<u>Percent Recovery (%)</u>
3-2	Mercury	0.0881	<0.040	<45
3-2	Mercury ^a	0.438	0.35	80
---	Split of above		0.36	82
---	Re-extraction of above		<0.040	<11
3-2	Mercury	2.08	0.97	47
3-3	Mercury	0.419	0.3	70
3-3	Nitrate ^b	5.12	-0.2	-4
9-2	Nitrate ^b	21.4	20.9	98
12-2	Cadmium	1.61	0.72	45

^a Analyses of split extract reported also.

^b Analyses were not made within 48 h.

Figure 1
Sample Area near the Excess Chemical Dump Tank

